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Volume 137 **Number 3418**

June 4th 1971

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COVER PICTURE

Burrell Showman's tractor No. 3631 built 1915 and owned by Mr Jack Lawrence, pictured at a Woodcote, Berkshire rally. The engine was used in Showland by W. Gritt under the name "Pride of Romsey" and later by M. Stokes, purchased in 1969 by Mr Lawrence who carried out a complete overhaul. Colour photograph by Ivan J. Belcher.

NEXT ISSUE

A Fairlie locomotive: exhibitions at Buxton and Norwich.

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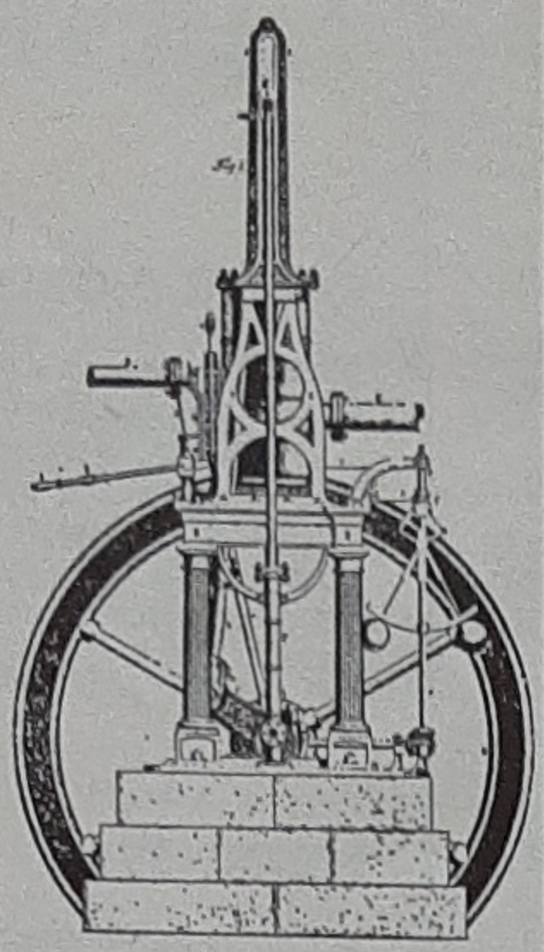

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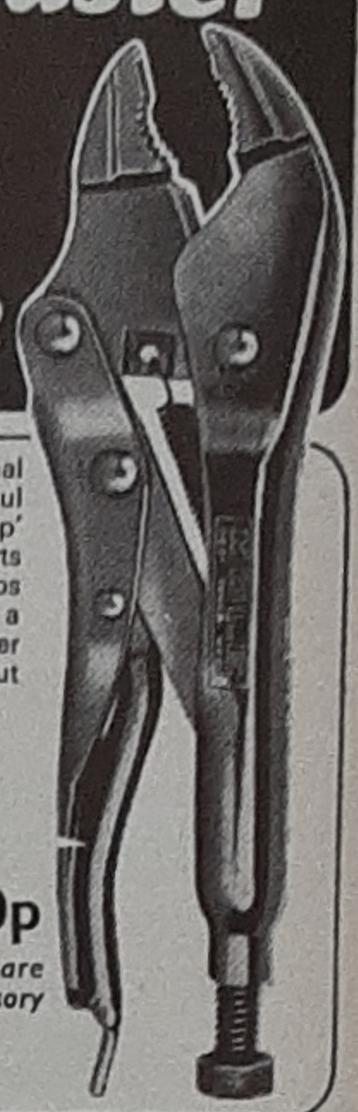

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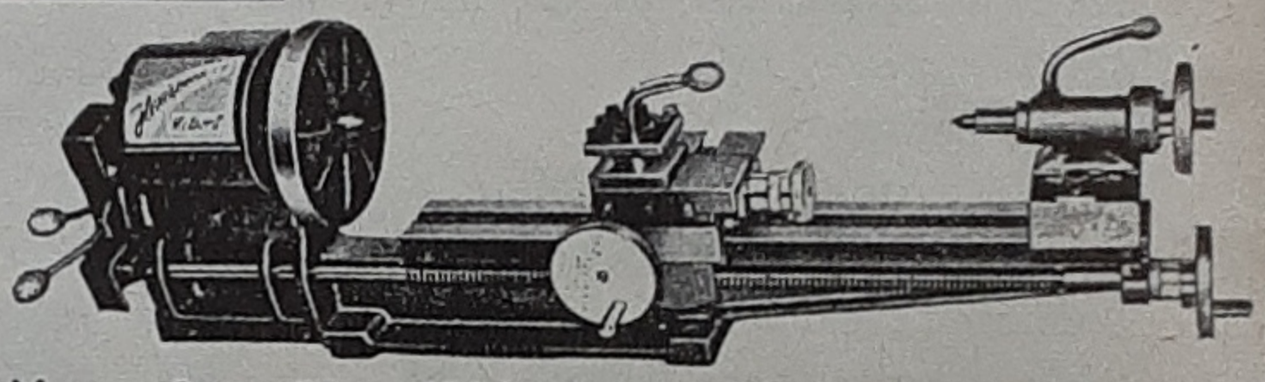

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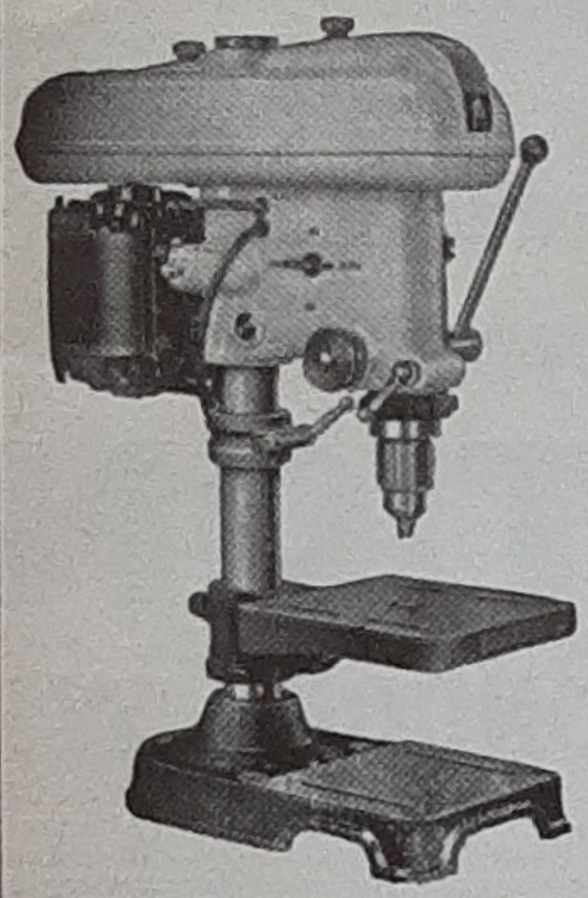

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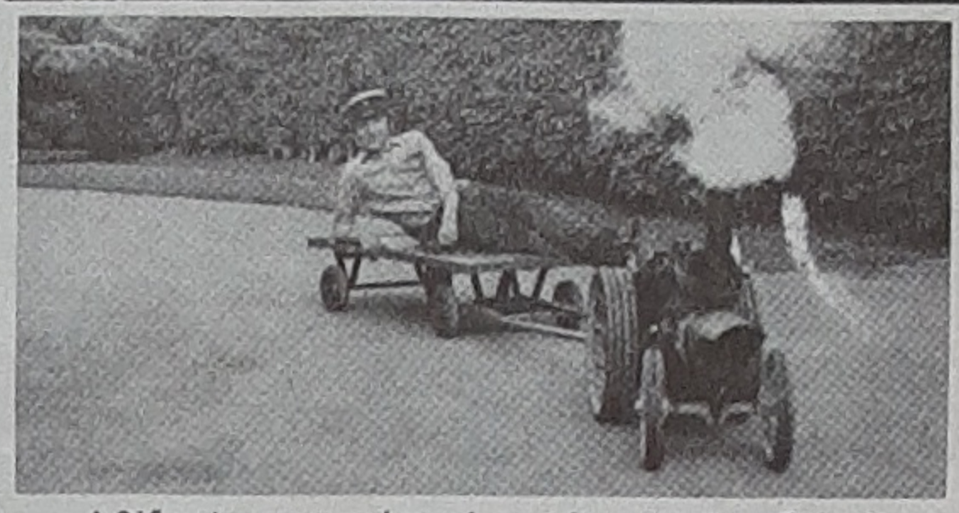

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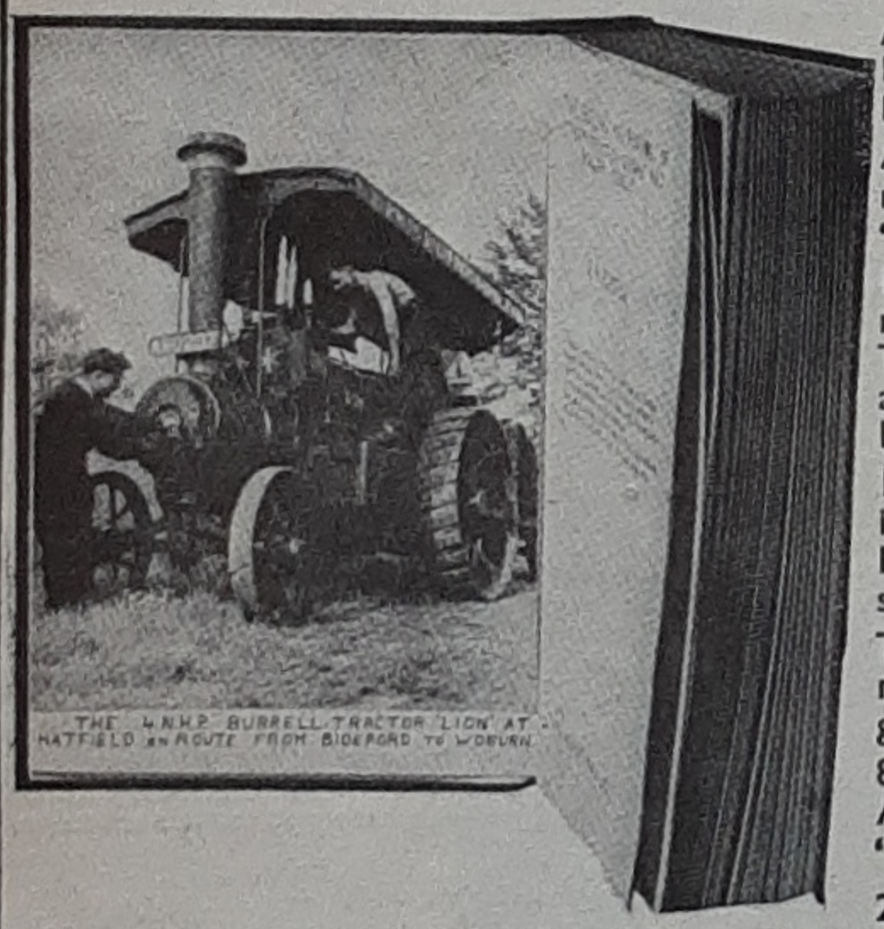

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12 years of professional contact with model builders has put the author in a unique position to produce this book, covering all aspects of Traction Engine model machining, building and running and in which the snags are simplified.

There are true stories of long journeys by steam engine (including the anxious moments) made by the writer and friends. Lots of drawings, action photographs, colour plates as well as useful machining charts.

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21 black and white plates. 29 line drawings.

The book should be on sale at the **FIRST EVER 2 DAY ALL MODEL RALLY on 19th & 20th June at Gregorys Rose Gardens, Stapleford, Nottingham.** This event is organised by the **Midland Counties Miniature Steam Engine Club.**
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ANNOUNCING . . .

MODEL RAILWAYS, the new bigger, better Model Railway News, makes its bow to the public with the issue dated September and appearing in August. This issue will be in the new popular A4 size, that is 11¾ ins. deep by 8¼ ins. wide. This will give us more opportunity for bigger and clearer half-tone illustrations and bigger drawings of layout and more drawings of locomotives and rolling-stock.

We shall continue our policy of an all colour cover and add to it in the shape of some spot colour, that is to say a second colour, on some of the inside pages and where we get a really lovely picture we will try and manage an inside picture or page of colour pictures to really do justice to beautiful layouts or beautiful models.

We are happy to announce that Roy Dock has rejoined the team and will be editing MODEL RAILWAYS, he is renewing his acquaintance with all levels of the model railway world and will, we are confident, recruit a great team of expert contributors.

OUR EXHIBITION . . .

The new MODEL RAILWAYS comes at the traditional beginning of the model railway season and we had an opportunity of taking Central Hall, Westminster, over the Bank holiday period, so, for the first time, we are sponsoring an exhibition devoted to the smaller gauge of Model Railways. This differs from previous exhibitions in that it is at the beginning of the modelling season rather than the end. It lasts for nine days, which includes two Saturdays and a Bank holiday Monday so that we feel there should be a great opportunity for enthusiasts to visit us for many in London, perhaps on holiday, who would not otherwise have had the opportunity.

NEW STYLE . . .

We are making one or two changes in the traditional presentation. The trade stands will be placed in the usual manner round the edge of the hall, but instead of having high walls screening off the central layouts these will be presented in what we can only call an open-plan form. We hope this will do more than justice to the trade displays and also enable some comparison to be made between one layout and another.

PROPRIETARY LAYOUTS . . .

We are endeavouring to present in addition to home-built layouts some idea of what can be achieved using nothing but proprietary equipment, This is the sort of layout that can be seen at Nuremberg, Paris, Milan or other of the great European Toy Fairs each year but which strangely enough never are available for the public to see unless they are in the trade. Another feature we hope to introduce will be an opportunity for members of the public to operate a layout on display. Here numbers must be limited but there will be a chance for everyone visiting the show to try and obtain some idea of the feel of a big layout and we hope go home enthused to achieve the same himself.

GRAND LAYOUT COMPETITION . . .

We are offering prizes of:

First Prize—£50. Second Prize—£30. Third Prize—£20.

for the best club or individual layout. The layouts displayed will be limited to 200 sq. ft. which gives a maximum size of about 16 x 12 ft. Gauges eligible will be O gauge, OO gauge, or N gauge and their fine scale equivalents.

How to enter is simple—a club or an individual has only to drop us a line and send a photograph of the layout; if possible a rough sketch/plan and a note of dimensions and special features. We will visit layouts which seem likely to be of interest and make our choice from them. A great deal depends on how well you describe your layout in the first place so while not asking for modesty we do ask for accuracy.

A condition of winning this competition is, that the first three layouts shall be available for display at our exhibition. We would be responsible for collecting the layouts and returning them after the exhibition and keeping them insured during that period. If the layout owner wishes, and is able, to demonstrate his layout during the exhibition with whatever team is deemed necessary so to do then expenses will be paid for this purpose. Alternatively, we shall be happy to provide reasonably skilled club operatives who would operate the layout or would alternatively assist the original owner. As a final encouragement the layout will be described in pictures in MODEL RAILWAYS at a future date and editorial fees for this will also be paid to the builder.

OTHER COMPETITIONS . . .

There will also be additional competitions for O gauge, OO and N gauges.

First Prize—£10. Second Prize—£7. Third Prize—£5

in each of these classes provided entry is not less than twelve models, should it exceed twelve then we would divide into additional classes, if less than six entered in any class then the prize rate would be halved. Classes will be open for entirely scratch built locomotives, locomotives built from any kit sets available and for best finished model additional classes will cover rolling stock as passenger coaches, ancient or modern, goods wagons of all sorts, including private owners' wagons, with special prize for the most original design. There will also be prizes for line-side features, low relief buildings and station buildings, wholely original or based on kit material with naturally the emphasis towards original work in cases of equal merit. There are no entry fees for any of the competitions. Entry forms are available on demand.

SOUVENIR HANDBOOK & GUIDE . . .

The first of the new MODEL RAILWAYS comes out on August 13th and will contain a special Exhibition Souvenir Handbook and Guide Supplement.

ADMISSION . . .

Hours of Opening:—

The exhibition will be open on the 26th August 1971 at 10 a.m. and will continue through daily to 9 p.m. except Sundays, when it will be closed, and will finish on Saturday, September 4th at 7 p.m.

It will be open on the two Saturdays and on the Bank holiday Monday all day.

Prices of Admission:—

Price of admission at the door will be 25p adult, 15p child. A child is regarded as anyone still at school. Children under 5 who have not started school and are accompanied will not be charged.

Reduced admission charges for pre-booking as under:—

Single and small number pre-booking tickets available from these offices. Adult 22½p, Child 12½p. Parties of more than 10: Adult 20p, Child 10p. Teachers i/c parties free—one per 10 in party.

A combined family ticket can also be bought in advance.

Enquiries to Exhibition Organiser

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SMOKE RINGS

A Commentary by the Editor

Now at Bressingham - "Terrier" No. 32662.

Below: Another recent arrival - ex. L.S.W.R. Adams B.4. 0-4-0T.

I.M.L.E.C.

The Birmingham Society of Model Engineers have chartered a special train to take members and friends to Southampton on Sunday, July 18. The train will leave from New Street Station, Birmingham, and buses will meet the train at Southampton to take the passengers on to the Track. There will be room on the train for members of other Societies in the Birmingham area, or for that matter, for lone hands, and application should be made as soon as possible to Don Crisp, c/o A. J. Reeves & Co., 416 Moseley Road, Birmingham 12, from whom full details will be obtainable. It is expected that the all-in charge will not be more than £2. Entrance tickets for those travelling on the train will be obtainable from Messrs. Reeves.

Entries for the competition have now closed and include several interesting locomotives, such as Mr C. R. Amsbury's 5 in. gauge G.W.R. 51xx 2-6-2 tank, Mr W. A. Heyden's G.W.R. Dean "Single" from Newton Abbot and Mr L. H. B. Woodhead's 5 in. gauge G.W.R. 47xx 2-8-0 from Brighton. LBSC will be represented by at least two "Maids of Kent," a *Speedy* and a *Princess Marina*.

Open Day at Neasden

The last day of steam locomotive operation on London Transport lines is to be celebrated by a commemorative run on Sunday June 6, from the City to Neasden Depot. On arrival at Neasden, the locomotive and train will be on view to the public as part of an Open Day being held at the Depot to celebrate the event.

The run will be made by one of the three remaining 0-6-0 pannier tank locomotives, No. L.94, hauling a train of engineers' vehicles rarely seen by the public. For those who wish to join in the

Continued on page 561

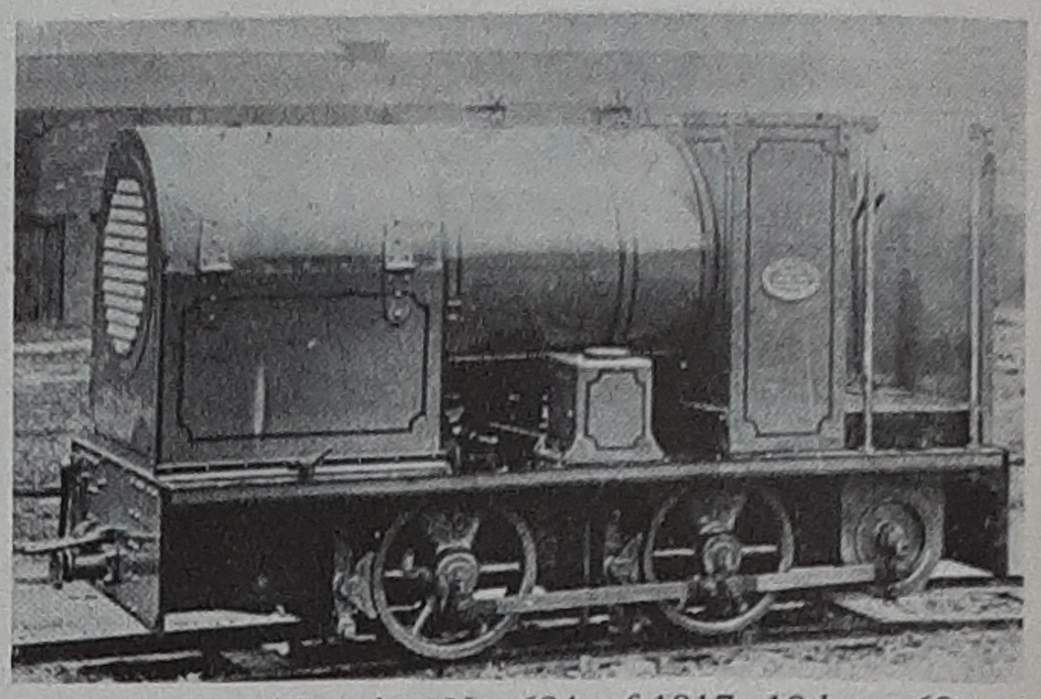
The ex-L.M.S "Royal Scot" on its way to Bressingham, seen at Garboldisham re-coupling to tractor ready for unloading the right way round.

The Petrol Locomotives of McEwan Pratt

by Rodney Weaver

DESPITE THE INCREASING INTEREST in model i.c. locomotives, there are few which are really correct to prototype. Even the late Edgar Westbury's classic " 1831 " can be criticised for being a model *diesel* locomotive powered by a *petrol* engine. For almost three decades before the advent of successful diesel locomotives, the petrol locomotive was made in a variety of shapes and sizes, yet few builders ever seem to consider a prototype from this period. One of the most famous names in petrol locomotives was that of McEwan Pratt, a firm whose products have interested me for some considerable time. In describing a few of the locomotives to have carried this name, I may perhaps give a few ideas for unusual yet rewarding projects.

McEwan Pratt began business in a small factory at Wickford, Essex, around 1905 and specialised in petrol locomotives and railcars, both McEwan and Pratt having sound practical experience of steam locomotive work. The firm soon made a name for itself throughout the British Empire and further afield. Unhappily, when on the threshold of significant developments in transmissions, the firm went into liquidation in 1912. It was bought up shortly afterwards by Baguley Cars Ltd. of Burton-upon-Trent, builders of petrol railcars for the Drewry Car Co., who continued the McEwan Pratt locomotive dynasty and reformed the old company as a subsidiary to handle locomotive sales. In 1925, following the decision to put locomotive sales into the hands of the Drewry Co. the old name was dropped. The traditions of those days are still carried on, however, by the present firm of Baguley-Drewry Ltd., now one of the few surviving locomotive builders in this country, who still supply the occasional locomotive to customers whose names appear in their earliest registers.



McEwan Pratt/Baguley No. 684 of 1917. 10 h.p., 60 cm. gauge prototype for War Department Light Railways.

In their independent days, McEwan Pratt built a range of standard locomotives most of which were of the same general pattern. Substantial plate frames were used in conjunction with generous running gear. Early locomotives had the axles coupled by external chains in a prominent chain case but later ones had coupling rods. The central cab was flanked by two bonnets, under one of which was the engine and under the other the fuel, water and oil tanks. McEwan Pratt are believed to have made their own engines, which were conventional side-valve units with cylinders cast in pairs. The gearbox was under the footplate and surmounted by a column which carried all the driving controls including the handbrake. The handbrake also worked the clutch, an arrangement designed to prevent accidental damage to the gearbox which, however, rather complicated the driving technique. From the reverse gearbox behind the main box, one axle was driven by a pair of chains, often

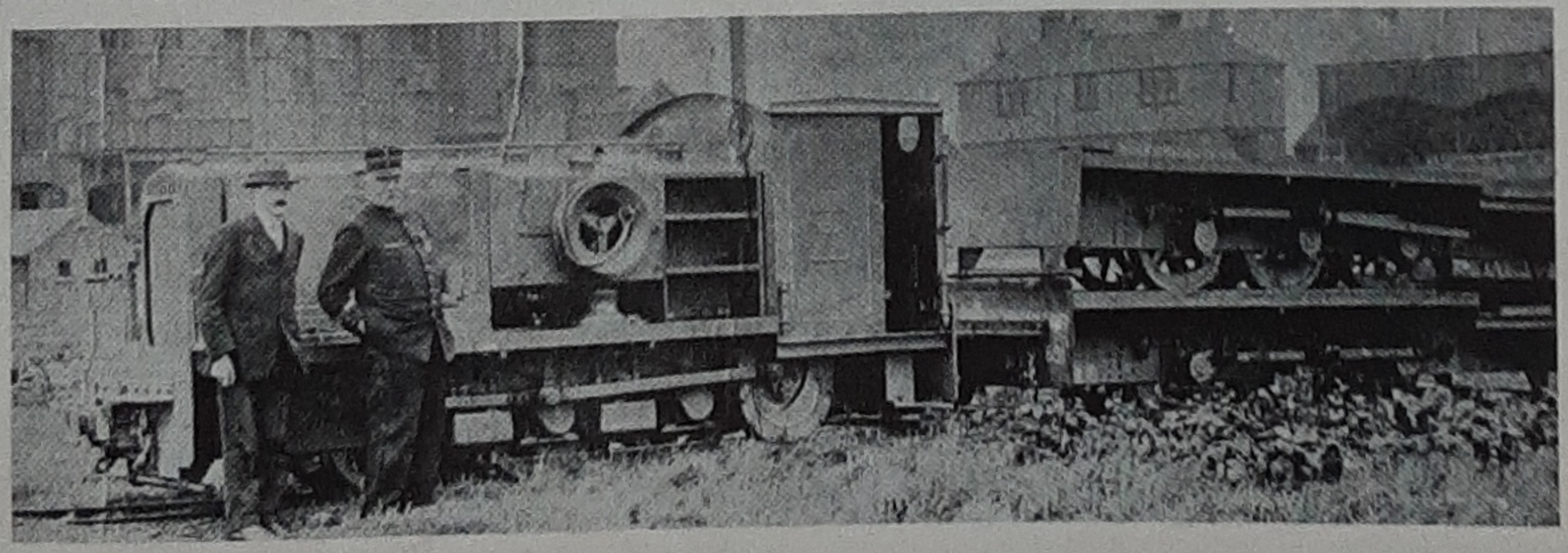
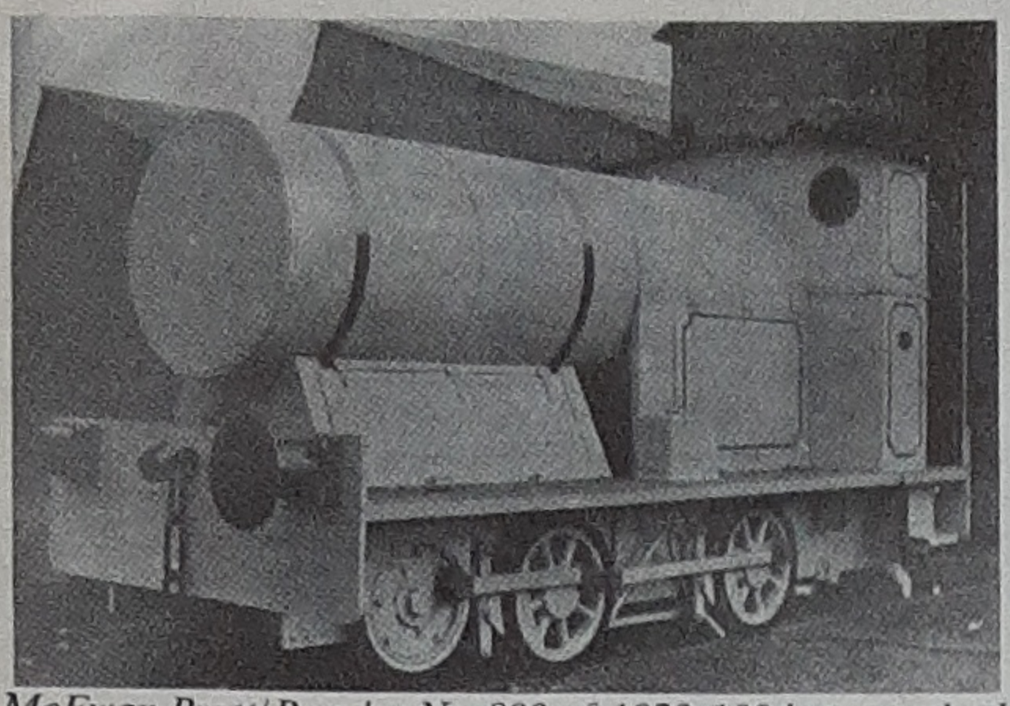


Fig. 2. McEwan Pratt/ Baguley No. 686 of 1917. 60 h.p., 60 cm. gauge 0-6-0 for French Artillery Railways.

Photographed during final trials at Burton.



McEwan Pratt/Baguley No. 800 *of* 1920. 100 *h.p. standard gauge for Dought, Son & Richardson. Locomotive not delivered and remained at Burton until sold to London Brick Co. in* 1933. *Now preserved in Shugborough Museum.*

enclosed in an oilbath. The most distinctive feature of these locomotives was the position of the radiators. These took the form of tubular assemblies at each corner of the footplate (there were two only on the smallest locomotives), the bottom tanks being at floor level and the header tanks in the roof. This meant that half the cooling surface was actually inside the cab on some locomotives, a rather drastic form of central heating!

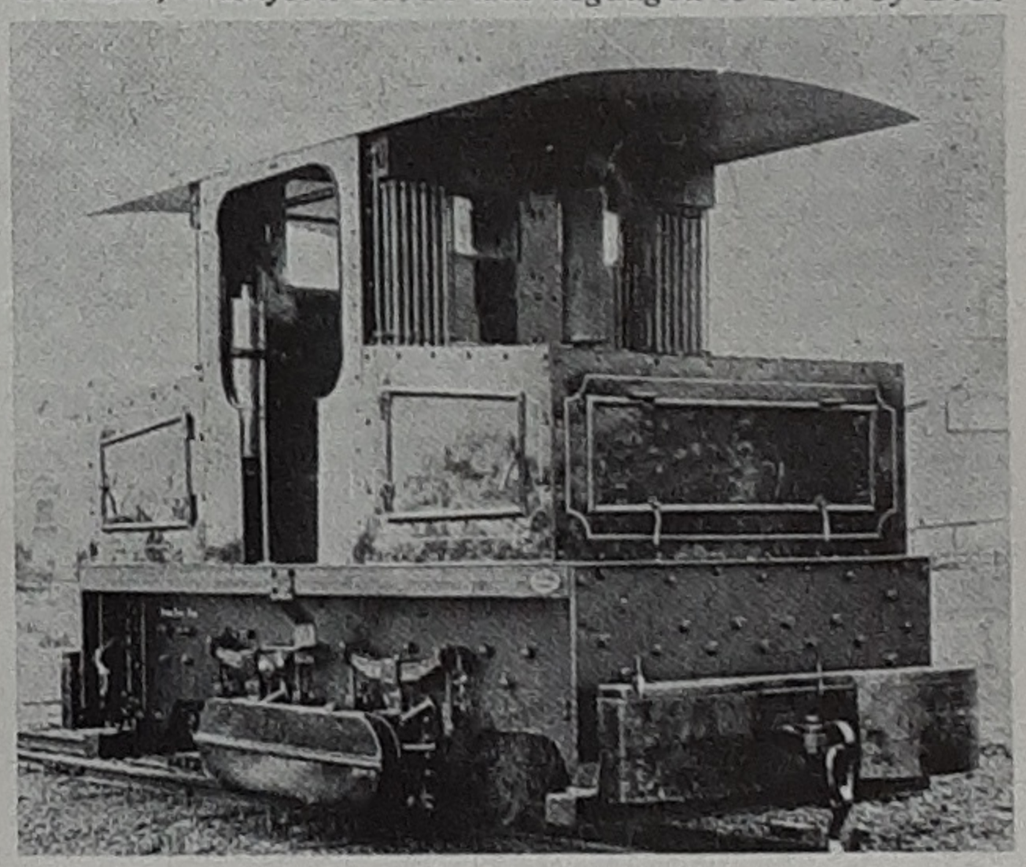
Locomotives of this design were made in sizes from 6 h.p. to 60 h.p. for any gauge and the illustrations show three examples. Fig. 7 shows the last locomotive built to a Wickford design, Baguley Cars No. 902 of 1915, a 24 h.p. " Type G " for 2 ft. 6 in. gauge. This was one of the locomotives built during the early part of World War 1 for the projected siege railways of the Royal Engineers, a scheme later abandoned in favour of the more flexible 2 ft. gauge War Department Light Railways. The next example, Fig. 4, is a locomotive built at Wickford for a 20 in. gauge line in about 1911 and regauged to 18 in. by Baguley in 1914 for service on the internal rail system at Woolwich Arsenal, where it acquired the name *Megaera*. This was a 40 h.p. " Type J," a big machine for 18 in. gauge; it was the same size as—and supplied to the same specification as—the Avonside oil-fired 0-4-0T's of 1916 such as *Woolwich* now on the Bicton Woodland Railway near Exmouth. *Megaera* was fully flameproofed and painted in Midland Railway livery. The last locomotive in the series, Fig. 6, is a rather later (c.1912) 55 h.p. " Type N " 0-6-0. I do not yet know where this locomotive went.

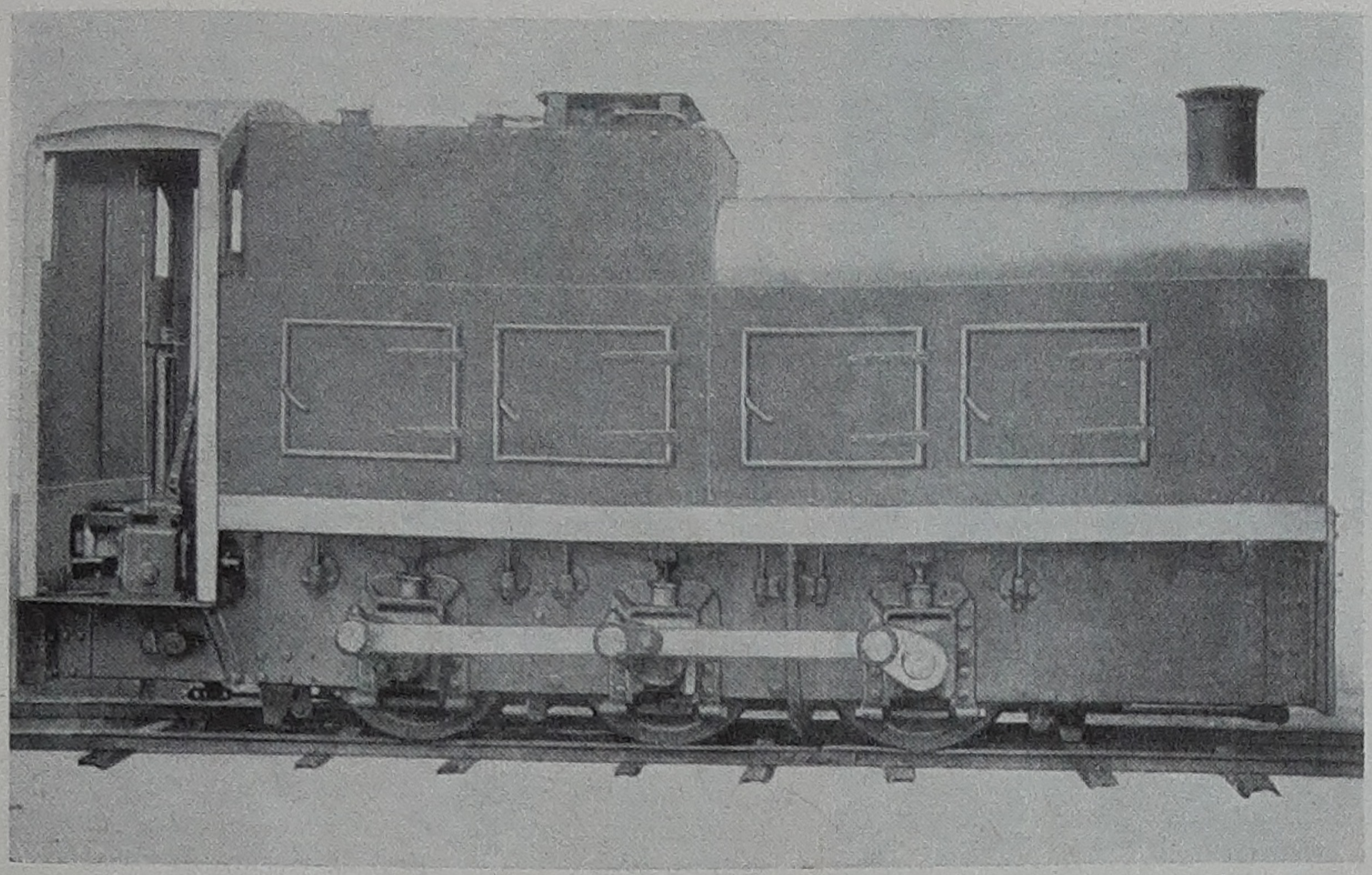
Besides these standard locomotives, the Wickford works were prepared to build locomotives up to 100 h.p. or larger to special order and Fig. 5 shows one of these, a 100 h.p. " Type P " 0-6-0 powered by a giant four-cylinder engine of 8 in. bore × 10 in. stroke. This again is not positively identified but may well be the notorious *Eardley Wilmott* of the Lodge Hill & Upnor Railway, which was delivered after McEwan Pratt folded up, was never persuaded to work properly and was quietly scrapped in 1915. The full story of *Eardley Wilmott* is shrouded in mystery although it certainly seems to have demonstrated its haulage powers effectively. Despite stories that it proved hard to start, I suspect that the real objection to it was the effort and skill required to change gear on such a massive machine.

McEwan Pratt were fully aware of the difficulties of working big mechanical transmissions and just before the collapse they started experiments with a new form of transmission designed to overcome them. This was the Hele-Shaw hydrostatic transmission and although Wickford never got as far as building a locomotive so equipped, their pioneer work enabled Baguley Cars to build the first rail vehicle with hydraulic transmission in 1913, a British pioneering effort that is now almost forgotten. Despite the fact that it is not strictly relevant to the present subject, a brief description of the transmission may be of interest in suggesting a novel approach to transmission design in model i.c. locomotives.

The Hele-Shaw transmission comprised, in essence, a pump coupled to the motor and one or more motors coupled to the wheels. The output of and direction of flow through the pump were controlled by the driver to provide an infinitely-variable and readily reversible transmission. Both pumps and motors were of rotary pattern, the cylinder block being in the centre of the pump with the cylinders connecting with one or other of two oil galleries as the block rotated. The plungers were controlled by a large bearing cage outside the cylinder block. In the pump this cage could be moved inside the casing about a mid position where it was concentric with the cylinder block. In this central position the

Baguley Cars Ltd., No. 630/14. *Built McEwan Pratt & Co. Ltd., Wickford c.*1911 *and regauged to* 18 *in. by B.C.*





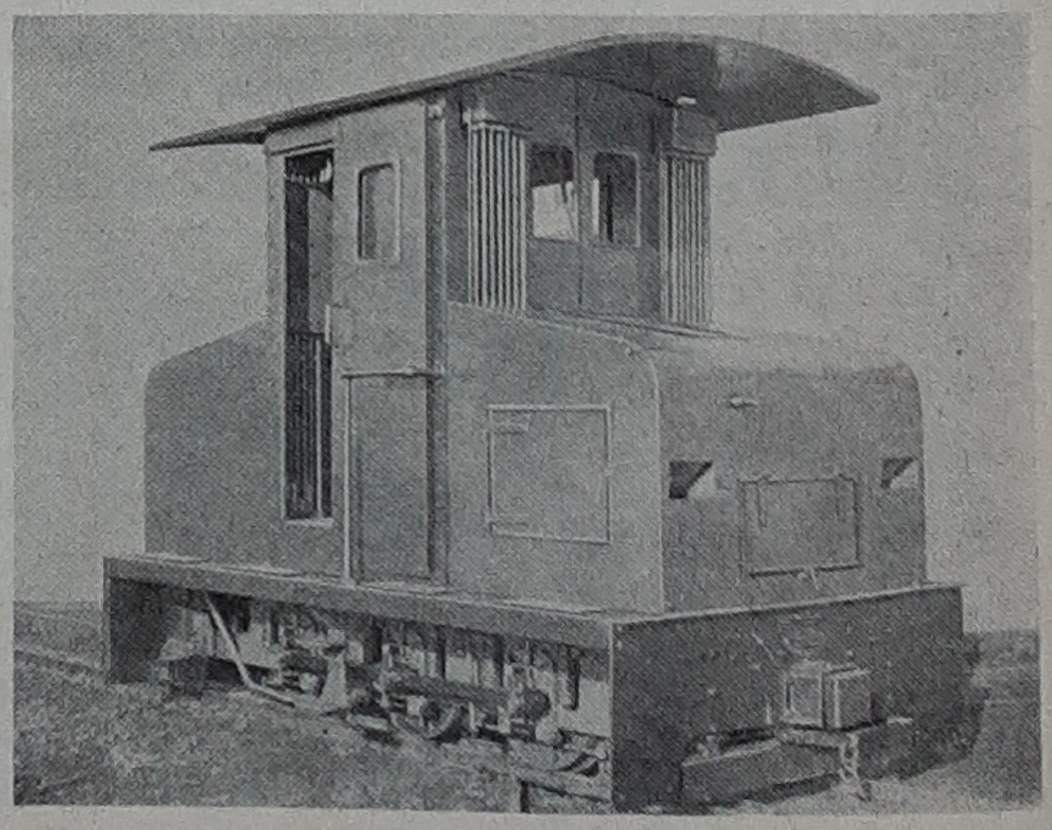
Left: Fig. 5. McEwan Pratt "P" type locomotive.

Below: Fig. 6. McEwan Pratt "E" and "N" type locomotive.

plungers rotated without reciprocation and the pump output was nil. Moving the cage either way caused the plungers to reciprocate and pump oil one way or the other. In the motors the cage had a fixed offset. To guard against damage there was a safety valve which limited the pressure developed by the pump during acceleration while the inevitable leakage past glands and plungers was made good by a small make-up pump. Given a light hand on the pump control this was an ideal transmission whose overall ratio could be adjusted with precision. Unfortunately it made too heavy demands of the hydraulic oils and seals of the day and, with World War I stifling such developments, it faded from the scene. Baguley had a 150 h.p. locomotive incorporating such a transmission on order at the outbreak of war, but construction was brought to a halt some months later.

The earliest Baguley/McEwan Pratt locomotives were Wickford designs with minor alterations and Baguley engines. One alteration, which affected both performance and appearance, was the removal of the radiators to a horizontal position below the running plate. If the drivers now kept cool the engines certainly did not and when fulfilling a repeat order from Assam, Baguley redesigned the locomotive entirely to produce the first characteristic Baguley locomotive. This type was soon to become famous—in its 10 h.p. form—on the W.D.L.R. These locomotives used a new transmission which necessitated the driving position being moved to the rear of the locomotive. Between the footplate and the engine was now a large water tank for cooling purposes, radiators being abandoned. The transmission, (Baguley & Bentall's patent No. 16030 of 1916) was mounted under the footplate. The clutch was still worked by the handbrake, but the first component was now the reverse gearbox, from which output shafts extended sideways directly above the jackshaft. At each end these carried loose pinions which meshed with gears on the flycranks, the ratio at one side being twice that on the other. One or other was engaged by a dog clutch to select the appropriate gear. The 10 h.p. locomotive, which proved by far the most numerous of this pattern, was powered by a two-cylinder engine of 4 in. bore × 5 in. stroke and had speeds of $3\frac{3}{4}$ or $7\frac{1}{2}$ m.p.h. at 900 r.p.m. Typically the engines developed 12 b.h.p. at 1200 r.p.m. The prototype weighed 4000 lb. in working order and could develop 900 lb. tractive effort at $3\frac{1}{2}$ m.p.h.

More than fifty of these little machines were



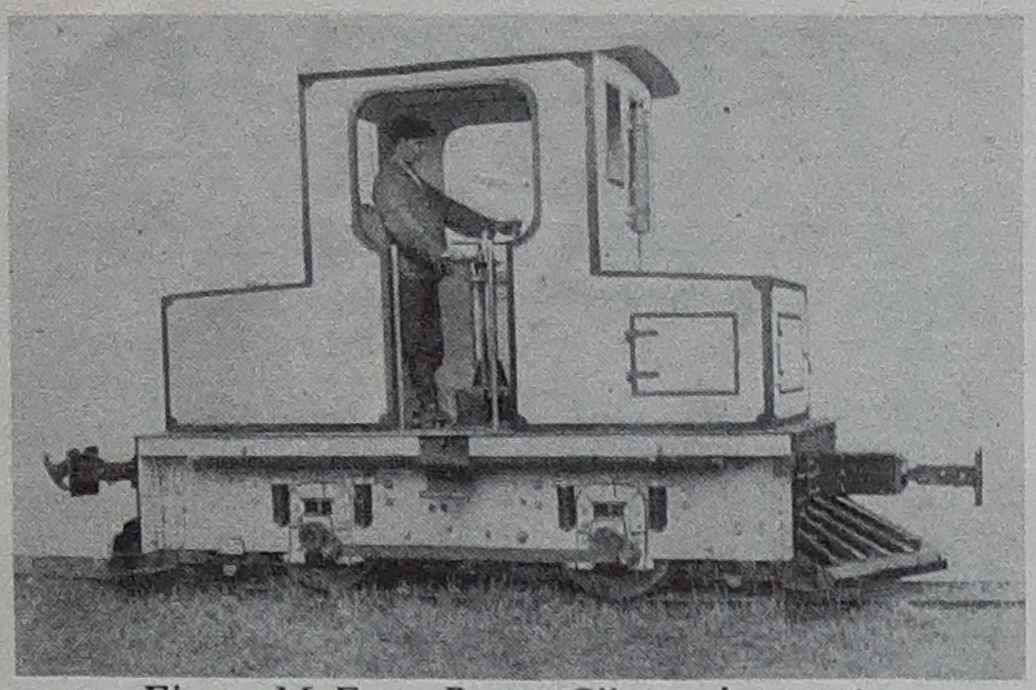


Fig. 7. McEwan Pratt "G" type locomotive.

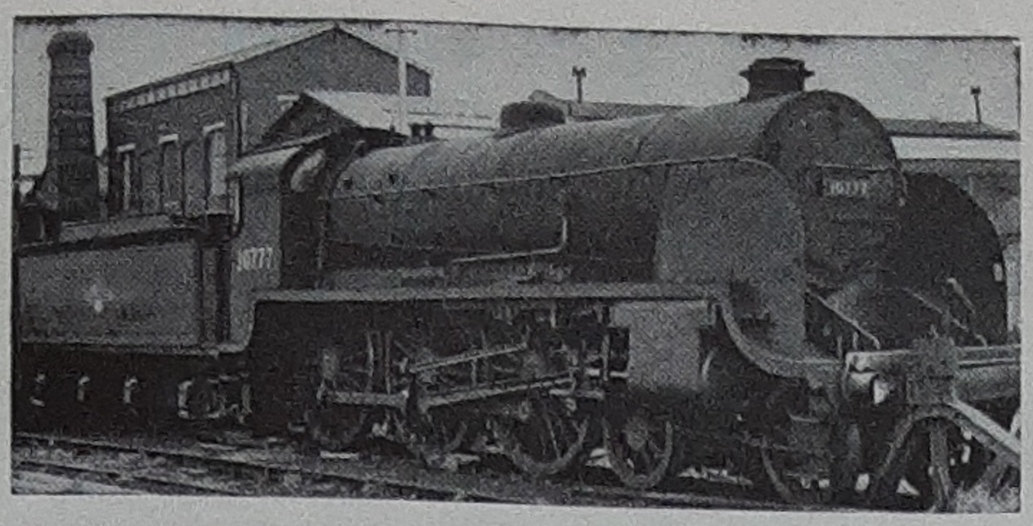
bought by the War Office between 1916 and 1918, of which some forty went to France for service on the W.D.L.R. Unfortunately they did not prove an unqualified success. The intention had been to use them on very light tramways close to the front line after dark, but although a specification had been drawn up and simulated field trials conducted, it rapidly became apparent that those in authority had seriously underestimated the sort of locomotive—indeed the sort of tramway—required in such situations. One unforeseen difficulty was that the exhaust pipes glowed in the dark and attracted sniper fire! After a brief exposure to front-line conditions, the locomotives were withdrawn to rearward areas where they could perform tasks more in keeping with their capabilities. At least one of the W.D.L.R. machines is still in existence and has recently been acquired for preservation. A larger locomotive of the same basic type, No. 680 of 1916, became the last McEwan Pratt in regular service and is now preserved at the Dinting Railway Centre. This is a 60 h.p. standard-gauge locomotive.

If the W.D.L.R. locomotives were a little disappointing, the ten 60 h.p. locomotives built for the French Artillery Railways in 1918 were a great success and can be numbered among the finest petrol locomotives ever built. The French were under no illusions as to the sort of railway needed to support their front line, possibly because they were better acquainted with the Deutsche Feldbahn organisation, and long before the W.D.L.R. organisation got off the ground, were buying such powerful 60 cm. steam locomotives as Pechot-Bourdon 0-4-4-0Ts to haul heavy supply trains or large pieces of artillery. The vulnerability of steam locomotives near the front line led them to consider powerful i.c. locomotives for forward areas, only to find that whereas 150 h.p. was required to equal the Pechot-Bourdons, nobody would commit themselves on 60 cm. locomotives much in excess of 60 h.p. Accordingly ten 60 h.p. McEwan Pratts were ordered for trial purposes while Baguley worked on the problem of larger units. The 60 h.p. locomotives proved to be very useful and as Baguley proposed to build any future units with 85 h.p. engines and multiple-unit controls, it is fair to assume that had the War gone on much longer a much larger order would have been placed.

These advanced machines were powered by a four-cylinder 127mm × 180mm White & Poppe engine rated at 60 h.p. The four-speed transmission was basically the same as that in the W.D.L.R. machines with the addition of a two-speed gearbox ahead of the reverse box; speeds at 900 r.p.m. were 5, 8, 12½, and 20 k.p.h. The locomotives were fitted with a powered winch (carrying 150 metres of wire rope), a powered capstan and a water pump. Vital parts were protected by armour plate capable of resisting machine-gun fire at 100 metres. Inside the cab the array of fluorescent instruments included such novelties as an inclinometer and a dynamometer recording the pull on the rear drawbar. Another feature which might have had wider application was the fitting of deflection gauges to the axleboxes so that spring condition or weight distribution could be checked from the lineside. Baguley were responsible for the whole of these machines except the engines and the frames, the latter being sub-contracted to Kerr Stuart & Co. of Stoke-on-Trent. Kerr Stuart subsequently tried to assert authorship of the entire locomotive! One of these fine locomotives is believed to have lasted at a sugar refinery until 1964.

In 1919 there appeared the last type of Baguley locomotive to carry the McEwan Pratt name, which will be recognised at once as the basis of subsequent Baguley steam-outline locomotives for the "miniature" railways at Trentham Gardens, Wicksteed Park and elsewhere. The "steam" appearance was the result of moving the engine to the middle of the locomotive and placing the water tank ahead of it in order to accommodate a new type of transmission. This transmission (Baguley's patents Nos. 125240, 127546 and 149450) was intended to solve the problem of changing gear by providing a separate friction clutch for each gear. Basically it comprised a duplex clutch which could engage one or other of two coaxial drive shafts, on the ends of which were the high and low gear pinions. Early versions used a double cone clutch, but the excessive axial loads required to operate this type led to the introduction of a plate clutch. Although it achieved its purpose, the Baguley "Duplex" transmission proved rather cumbersome and was ultimately dropped in favour of a conventional type. (The Wicksteed gearbox used by Henry Greenly in *Blacolvesley* achieved the same result in a more practical manner and one wonders why a strengthened version of this was not used. Not until the perfection of the Wilson epicyclic transmission a

Continued on page 554



ELAINE

A 2½ in. gauge "King Arthur" class locomotive

described by Don Young

Continued from page 399

ALL THE FOUNDATION RING sections are from $\frac{3}{16}$ in. square copper bar. Cut one piece 1 $\frac{13}{16}$ in. long and shape to fit inside the throatplate. Position the firebox inside the boiler shell, with the crown stay girders hard against the inside of the outer wrapper; I hope you see what I mean! Clamp the firebox tubeplate to the throatplate, sandwiching in the front section of the foundation ring. Mark off on the outer wrapper, at approx. $\frac{1}{2}$ in. pitch, for the crown girder stay securing rivets. Drill these through No. 51 and countersink the outside. Clamp a length of $\frac{3}{4}$ in. square bar, or thereabouts, horizontally in the bench vice, as a riveting dolly. About 5 in. should protrude from the vice jaws. Use long nosed pliers to insert the rivets on the inside. Slide over the dolly and hammer well down into the countersinks. Whilst in this area, mark off and cut out the $\frac{5}{8}$ in. diameter hole for the safety valve bush. This latter item is turned up from $\frac{3}{4}$ in. diameter drawn gunmetal or bronze bar and is $\frac{1}{4}$ in. overall length. Sorry I forgot that dimension on the drawing. Do not fully tap the bush at this stage, though it is a good idea just to start the taper tap. It is then much easier to tap the bush out squarely later on.

Whilst we are dealing with bushes, the four required for injector steam, turret, and water gauge can be "knocked off." Only the first two are fitted at this stage, into $\frac{3}{8}$ in. dia. holes drilled in the outer wrapper. The clack bushes are next, again simple turning jobs with the same comment about the thread in the bore. Tap the boiler barrel, taking care that the point of the tap does not damage a firetube. Screw the bushes home.

Next comes a job for patience, fitting the smokebox tubeplate. Use a pencil to align any misbehaving tube, then use a greased taper pin to lightly expand the tubes into the tubeplate. That leaves the fixing of the foundation ring. For the front section, drill two no. 51 holes, each about $\frac{1}{4}$ in. from the centre line right through throatplate, ring and tubeplate. Try to get the holes nicely central in the foundation ring. Fit $\frac{1}{16}$ in. dia. rivets, heads on the inside, and hammer down into countersinks in the throatplate. At this stage in the proceedings, try the backhead in position; the firehole ring will prevent full penetration into the outer wrapper. If the fit looks good, make and fit the side pieces of the foundation ring. It makes for an easier final braze. From this stage on I would use Easyflo exclusively, it makes the job that much simpler. Flux well around the girder stays, foundation ring, front tubeplate and clack bushes. Lay the boiler on its back, foundation ring uppermost, and get the torch going on the top of the outer wrapper. By watching from the backhead end you will be able to see the job begin to get to red heat. Feed in spelter, which should run freely all through these two joints. Next, concentrate on the foundation ring, again you will be able to watch for full spelter penetration over much of the ring. Turn the boiler on its end and braze in the smokebox tubeplate, again taking care with the vulnerable tube ends. Next pay attention to the clack bushes; little heat will be required here.

Turn the boiler right way up, and if the spelter has not flowed into the safety valve and injector bush holes, fit the bushes and braze them in. If the bushes won't enter, don't worry, stop, pickle, wash and clean the job. Then remove the excess spelter to allow the bushes to enter their holes.

Hold the backhead in position and scribe a circle back through from the firehole ring. This will be about $\frac{15}{16}$ in. dia. Cut out this hole, then open out carefully, with a half round file, to 15/32 in. dia., a good fit over the firehole ring spigot. At the same time, keep checking that the backhead is going to fit inside the wrapper properly. Chamfer the hole lightly on the outside, to assist in peening the ring over. Do this, supporting the inside of the ring on a substantial piece of bar held in the bench vice. Now tap the wrapper down onto the backhead flange, to remove any gaps. Any gaps that refuse to close can be dealt with by the Martin Evans gunmetal screw technique. Drill for and fit the remaining two bushes in the wrapper, adjacent to the backhead. If those side sections of the foundation ring were not fitted earlier, now is the time to give attention to them. Finally, fit the back section, just as for the front one. Fill up any gaps in the corners with small slivers of copper, wedge shaped so they can be driven in.

Stand the boiler vertical, and take care not to knock it over! Flux the backhead joint, not forgetting the firehole ring, then the bushes and finally

the foundation ring. Finish brazing the foundation ring first, laying the boiler on its back if the spelter misbehaves and does everything but run into the joint. Next, start at a bottom corner and work around the backhead joint, concentrating on the firehole ring as you pass it; going up is best. Finally, braze in the bushes on the top of the wrapper. This time, take especial care when lowering the boiler into the pickle bath. I use a long length of bar, about ½ in. × $\frac{3}{16}$ in. section, bent into an " L " and then inserted in through the firehole ring. The " handle " wants to be about two feet long, to avoid any gushing acid. Since these notes were " penned " yours truly has taken note of the excellent advice of Martin Evans to wait until the boiler has cooled off before pickling. Quite the right approach with a proper pickling solution, but mine has gone off so badly that a " hot dip " is required to break away the flux. I used to replenish my tank from a local garage, after assuring the proprietor that it was going to be used for a legal purpose! In the last couple of years, batteries have been delivered complete with acid and fully charged, so this source has dried up.

Wash the boiler very thoroughly this time, clean up and inspect for " misses "; this applies at every stage. When satisfied, tap out the hole drilled in the front tubeplate, and the bushes. Fit temporary plugs. File the dome bush flat, brazing will have certainly distorted it. Hold the dome in place and spot through the No. 41 holes. Drill the bush No. 48 and tap 7 BA. Fit the dome, using a brown paper gasket soaked in linseed oil. Or alternatively use 1/64 in. thick C.A.F. (Hallite) jointing material. obtainable from several of our suppliers. Make an adaptor for the dome plug hole, to suit a cycle inner tube valve. Retire to the domestic sink, immerse the boiler and apply about four pump-fuls of air. No more, or the soft plates will distort. Inspect for tell-tale bubbles.

For those suffering from this " disease," please refer back to my previous notes on the Rail Motors. I am not going to repeat the tales of woe again for a while. Those whose boilers survive this test can sit back for a moment and take some refreshment. They have earned it!

This time I am going to suggest that the hydraulic pressure test be carried out with all the boiler fittings in place. After all, succeeding tests on " Elaine " and " Sir Ironside " will be carried out in the same manner.

Firebox stays

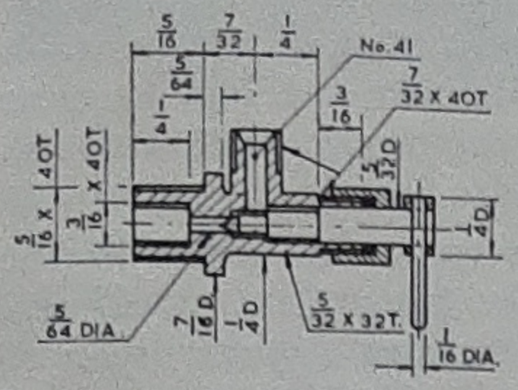
Mark off the four rows of firebox stays on the outer wrapper and drill through No. 40, with the drill held perpendicular to the plate. Then the stay nuts should sit fairly well inside the firebox. Stay taps are so expensive these days, when obtainable, that unless you have one handy it is best to invest in a new set of standard commercial 5 BA taps. I know this is very repetitive, but with new taps there is far less likelihood of tearing the threads in the soft copper. With 16 s.w.g. material, there are only a full two threads available anyhow; so a tear can be disastrous. Insert the No. 40 drill into the next hole to that being tapped. Use as a " sight," for aligning the tap to, so that it meets the inner firebox hole correctly. Remove the tap, to clear all the swarf away, after tapping the outer wrapper. This will save trouble at the firebox.

There are only two stays to be fitted in the backhead, and four in the throatplate. Drill and tap for these as well. Nowadays I much prefer to fit monel firebox stays. But unless one is very careful, they are not satisfactory in 16 s.w.g. material. Monel is a most peculiar metal in some respects. One feature is that the threads sometimes tend to " fire " when screwed into soft copper. I first met with this problem on the Isle of Wight Locomotive boiler, some ten years ago now. A chat with some of the lads in the Works machine shop brought forth a clear green fluid, the origin of which is still unknown. I believe it was undiluted cutting oil as used on surface grinders. Anyhow, it did the trick. Unfortunately, my stock is exhausted, and when I tried a " dry " run on a piece of 16 s.w.g. copper, the result was a completely stripped thread in one instance. A real disaster if that plate had been part of a boiler shell! So our material must either be phosphor bronze rod, or copper as a last resort.

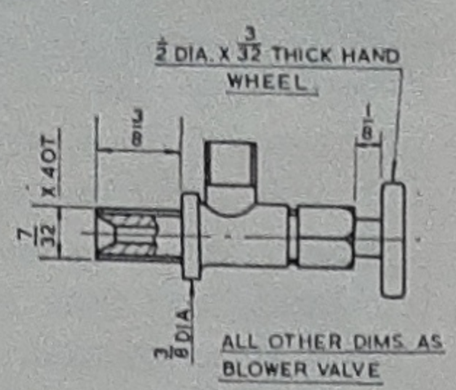
The total length of stay rod required is in the order of 3 ft. 6 in.; cut into 3 in. pieces. Chuck a piece in the 3-jaw, face the end and screw 5 BA for about ½ in. length. Screw into one of the top row stay holes, and check the length with a 5 BA commercial brass nut inside the box. When tightened up there should be at least one full thread protruding through the nut. When all is O.K., repeat the dose on enough pieces of rod to complete that row of stays. Screw the first stay tight into the outer wrapper, but not so overtight that it begins to destroy the wrapper threads. Saw off about $\frac{1}{16}$ in. proud of the wrapper. Fit the stay nut and tighten this in turn. Finish off this row of stays, then carry on, working down each side of the firebox. Finally, tackle the throatplate and backhead.

This time I am not going to advocate riveting over the projecting stay end; merely file down to within 1/32 in. of the wrapper. Hammering could destroy some of those delicate threads. To caulk over the stay heads, we need some high silver content solder, with a melting point around 300 deg. C., like " Comsol." Fit a small sized nozzle to your Propane torch and obtain a fairly diffuse flame.

Surprisingly little heat is required. Work around the outside of the box, giving each stay "the treatment." Now, move inside the box. For much of the time it is better to play the torch through the firehole ring, the flame is more stable. Deal with each nut in turn, not forgetting to run solder around the thread projecting through the stay nut. Clean up and inspect.



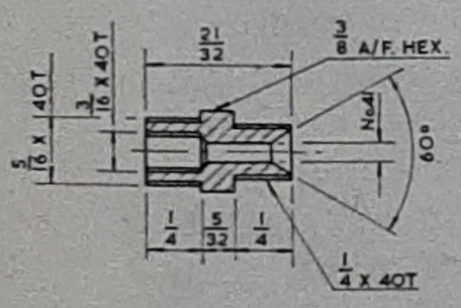
BLOWER VALVE - 1 OFF BRASS S/S FITTED



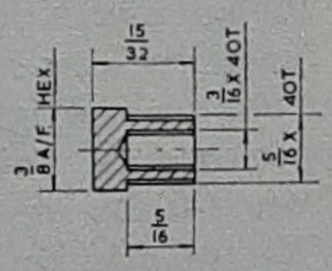
EJECTOR STEAM VALVE - 1 OFF

Blower Valve, Ejector Steam Valve, Stay Plug, Blower Union

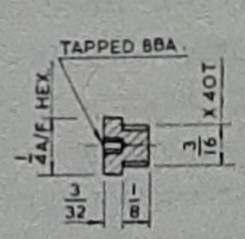
The longitudinal stay is a 13 in. length of $\frac{3}{16}$ in. dia. copper rod; the blower stay of identical length being $\frac{3}{16}$ in. o.d. × 16 s.w.g. wall thickness. Screw each end 40T for $\frac{1}{2}$ in. length. The stay plugs are simple turning jobs requiring no description. Next, drill and tap all the requisite holes in the backhead for the various fittings. Enter the solid stay into one of the stay plugs, just a couple of turns, then coat the outer thread with Boss White or other proprietary jointing compound. Screw hard into the R.H. tapped hole of the smokebox tubeplate. That's the L.H. hole facing you from the front end, although it is the R.H. side of the engine, if you see what I mean. Anoint the thread on the back end fitting, screw onto the projecting end of the stay and tighten into the backhead. The blower union is another simple turning job. Next we need the blower valve. This is so similar to that employed on *County Carlow* that there is no necessity for repetition. Screw hard into the backhead, before positioning the union connection, at about 11 o'clock. Assemble the blower stay in the same way as the solid one. The ejector steam valve can be dealt with at the same time as the blower valve.



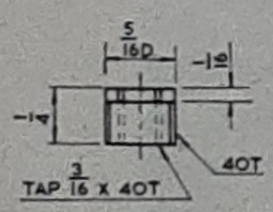
BLOWER UNION - 1 OFF BRONZE



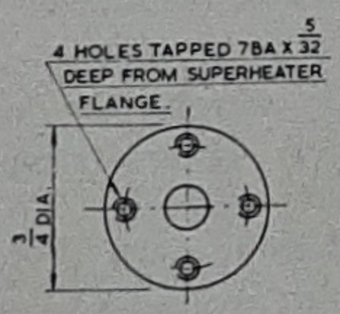
STAY PLUG - 2 OFF BRONZE

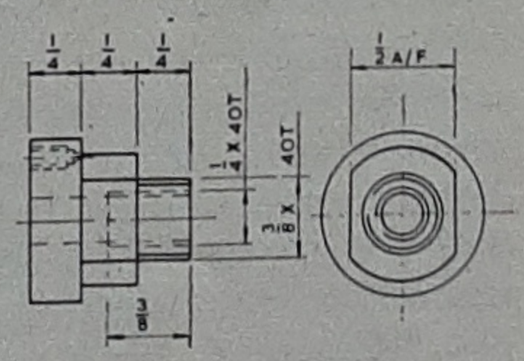


DOME PLUG
1 OFF - BRONZE



CLACK BUSH
2 OFF
GUNMETAL



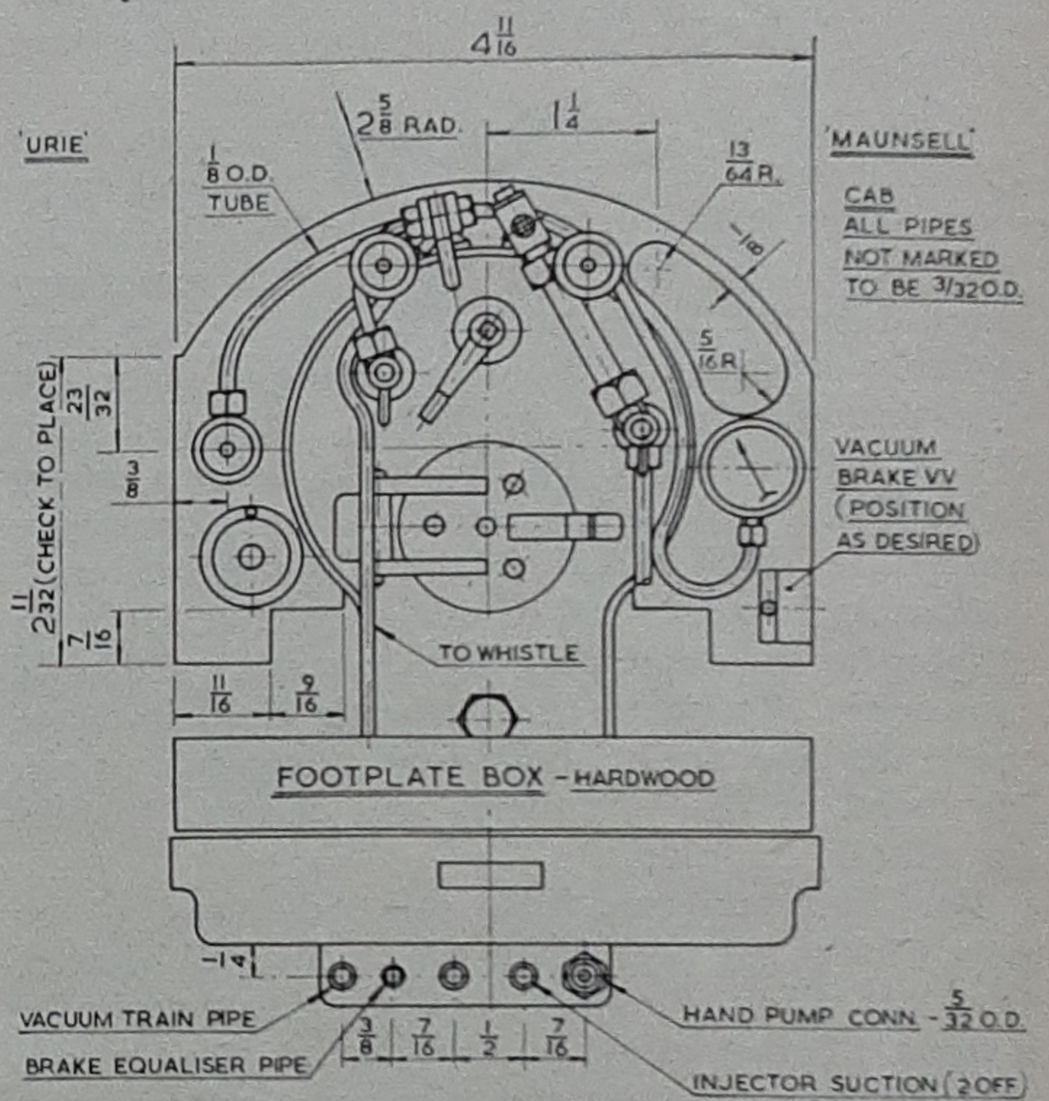


STEAM PIPE FLANGE - 1 OFF GUNMETAL

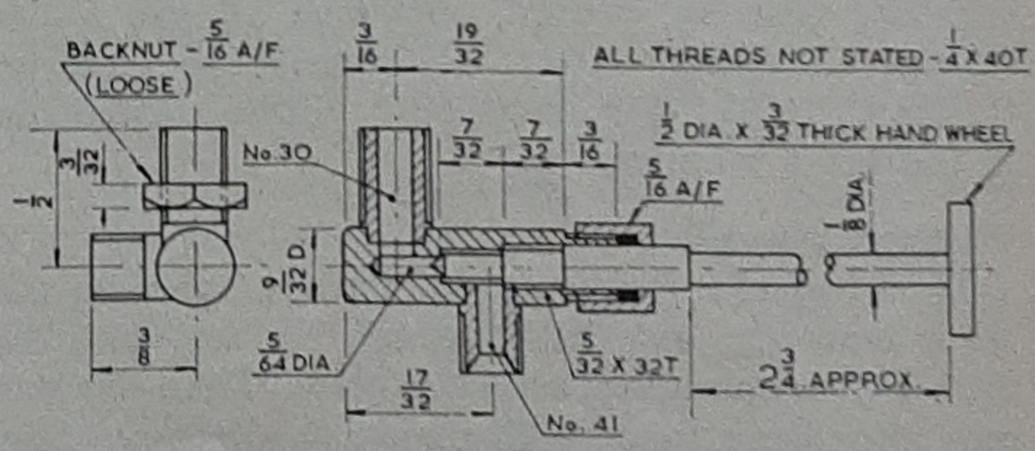
Water Gauge, Turret, Clacks

Water gauge, turret and clacks are all so similar to *County Carlow* as to require no description. Yours truly is beginning to arrive at some "standard" fittings.

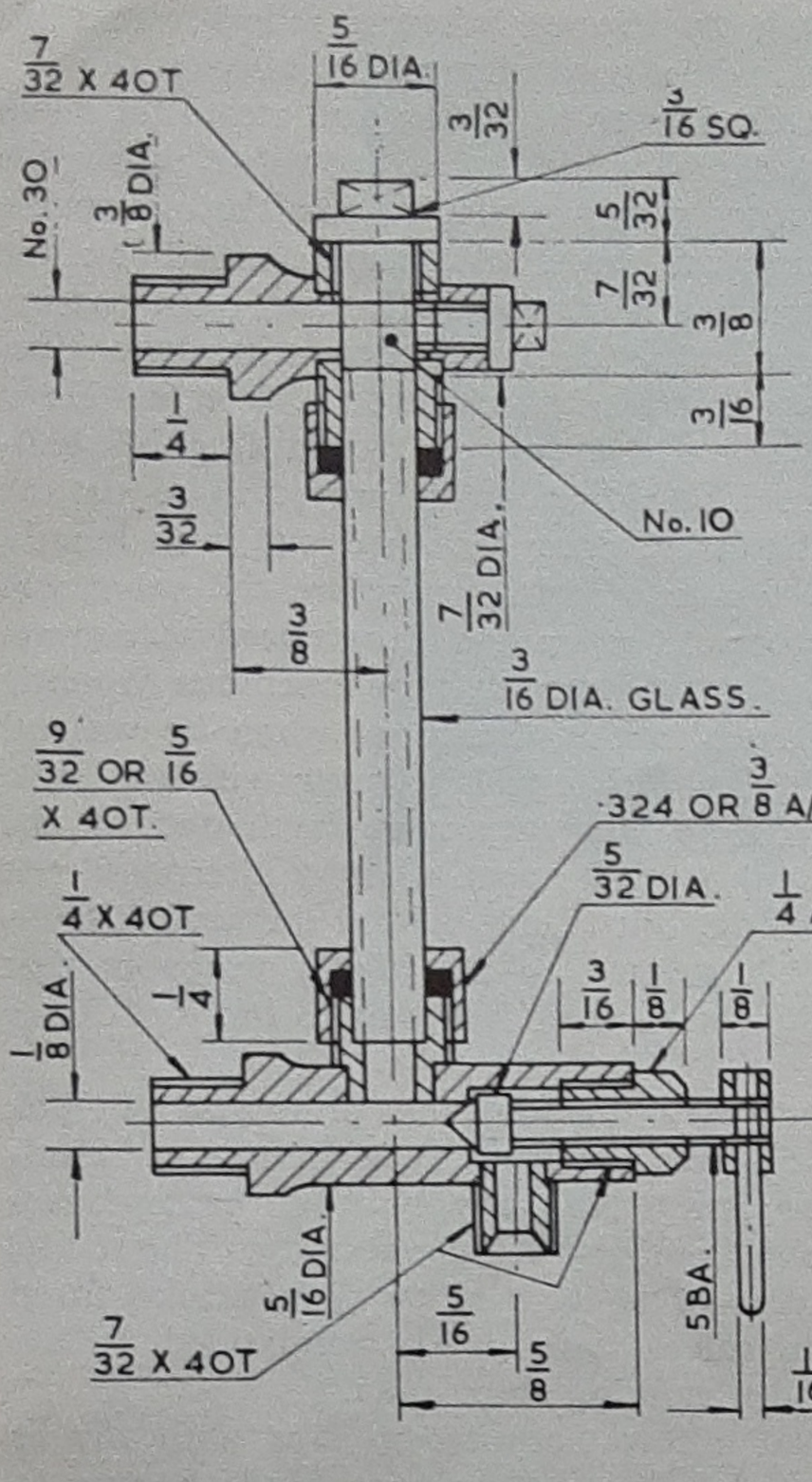
So that the positions of the fittings can be seen more clearly, the backhead arrangement will come in very handy here. I hope you like the layout. As usual, it took quite a lot of time to get things into some semblance of order. The driver has everything at his finger tips, except for having to dash across the footplate to apply the vacuum brake! No doubt some builders will contrive to give this fitting a position on the L.H. side of the cab. The fittings should be self-explanatory, thanks to Helen's marvellous work with pen and Indian ink. A small elbow is required from the top water gauge fitting to the boiler bush, which should not overtax the ability of any builder.



CAB LAYOUT

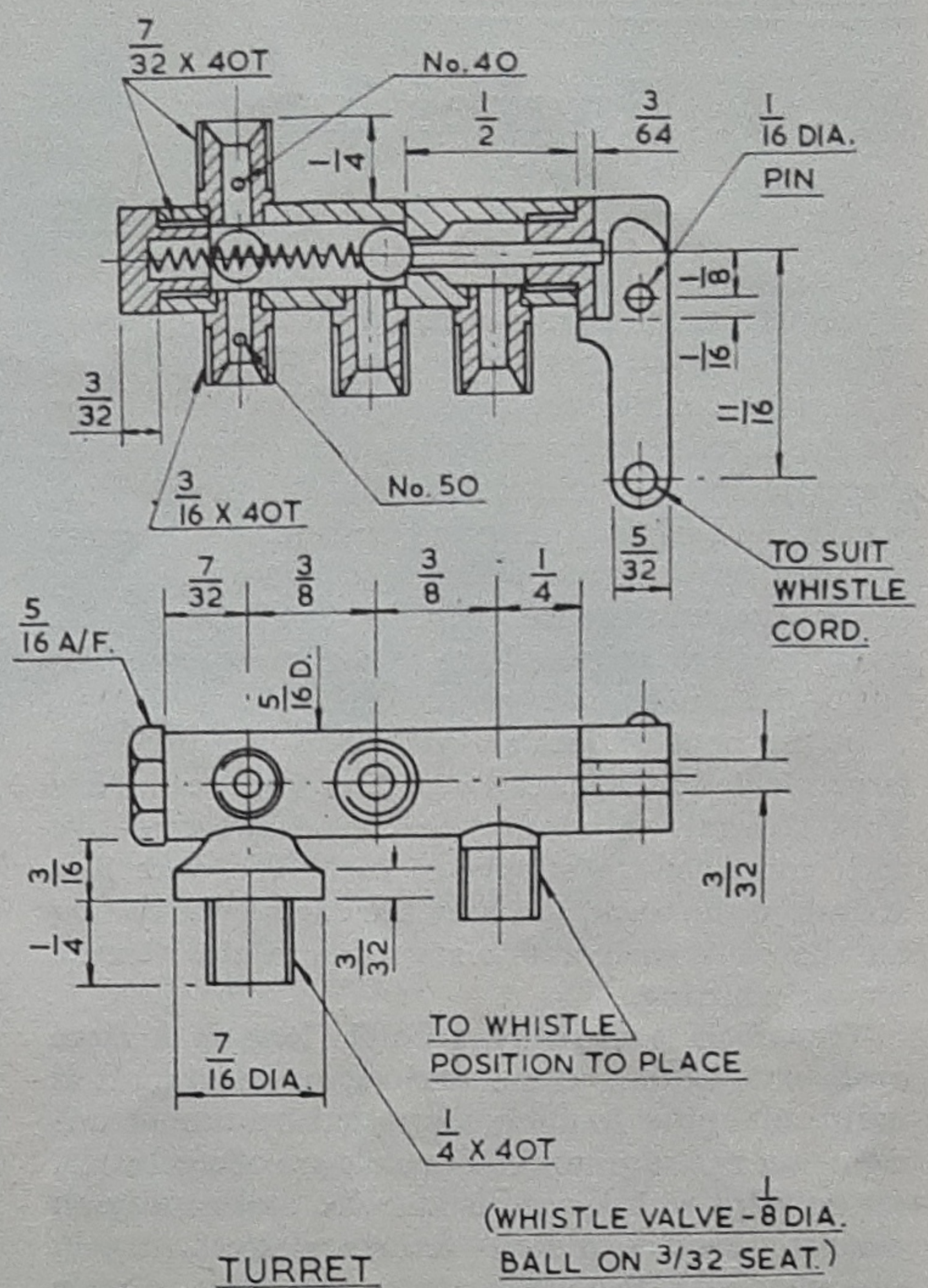


INJECTOR STEAM VALVE - 1 OFF R.H, 1 OFF L.H. BRASS S/S FITTED



WATER GAUGE - 1 OFF

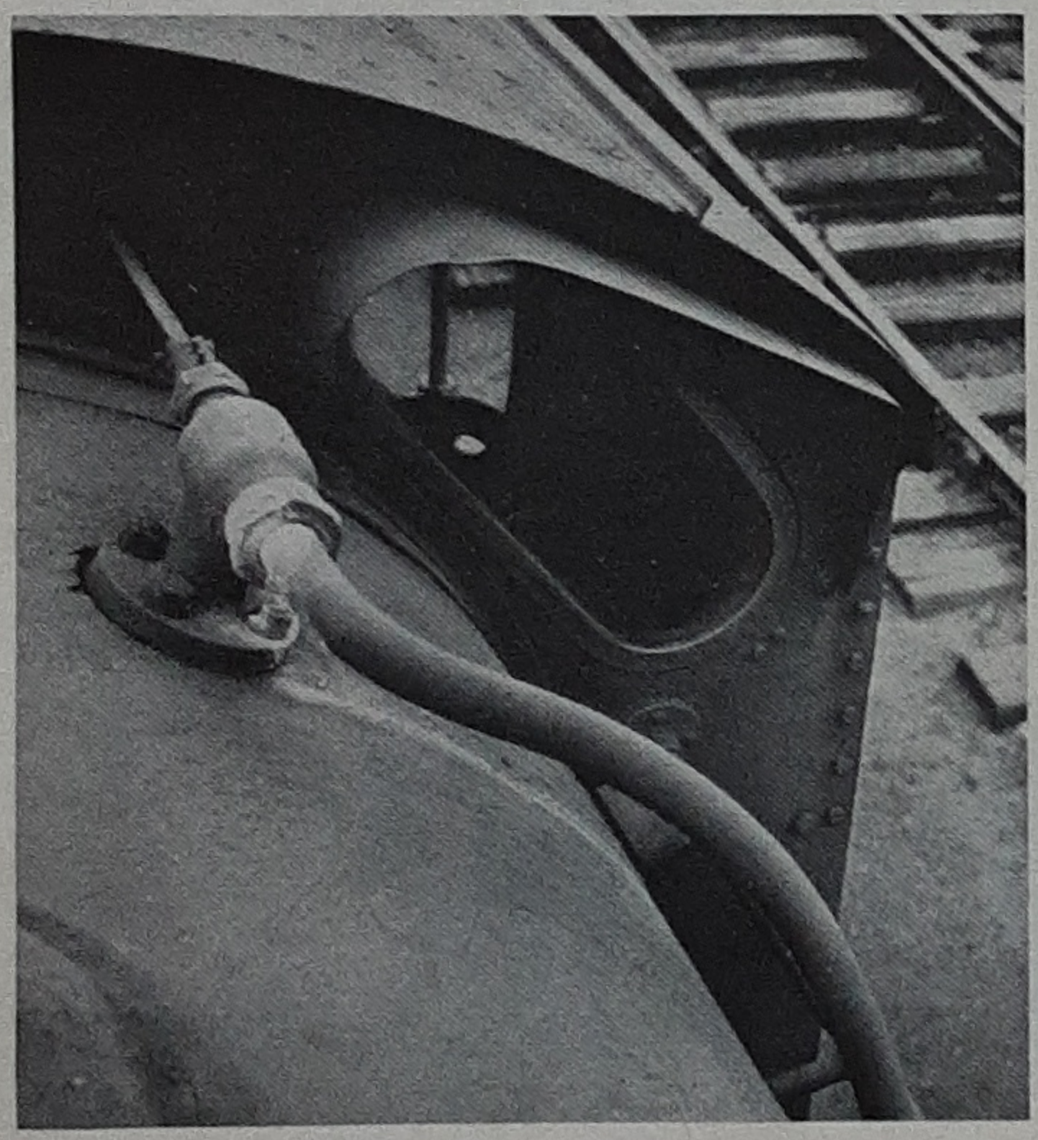
BRASS ST. STL. FITTED



(WHISTLE VALVE - 1/8 DIA. BALL ON 3/32 SEAT.)

TURRET

1 OFF - BRASS ST. STL. FITTED.



Injector Steam Valves

The injector steam valves are very similar to the pattern used on my Isle of Wight locomotive. Start with a length of $\frac{5}{16}$ in. dia. drawn gunmetal, or brass rod in the 3-jaw. Turn down for a full 1 in. length to 9/32 in. dia. Further reduce the outer $\frac{3}{16}$ in. length to $\frac{1}{4}$ in. dia. and screw 40 T. Centre and drill 5/64 in. dia. to $\frac{7}{8}$ in. depth. Follow up with No. 30 to $\frac{9}{16}$ in. depth and " D " bit to $\frac{5}{8}$ in. depth. Tap 5/32 in. × 32 T as deep as possible, without damaging the valve seat just formed. Part off at 31/32 in. overall, lightly radiusing this end. Clamp in the machine vice, on the vertical-slide, and end mill a recess at $\frac{3}{16}$ in. from the blind end, to about $\frac{1}{16}$ in. depth. Turn up the boiler adaptor from $\frac{1}{4}$ in. brass rod, to fit into the recess. At 17/32 in. from the blind end, and at 90 deg. to the boiler adaptor, remembering the bodies are handed, drill say No. 16 into the bore. Turn up the union connection a tight fit in the No. 16 holes. Silver solder together, pickle for a few minutes only, then clean up. Now drill No. 30 from the boiler adaptor into the 5/64 in. central hole.

To be continued

TALKING ABOUT STEAM

W. J. Hughes in Canada

WHEN MY FLIGHT from Calgary touched down at Winnipeg, I was met by Jack and Margaret Kerr, a pleasant couple who took me off to their home for the short weekend which unfortunately was all that my schedule allowed me in Winnipeg. This was on the Friday evening and on Saturday morning we were up betimes so as to be able to put in several hours at the Red River Valley Railroad, the track of the Manitoba Live Steamers, a few miles out of the city in open country.

In the boot of Jack's BMC 1800 was packed a large picnic lunch, Jack's very fine ¾ in. scale New York Central "Hudson" class (4-6-4) locomotive and tender, and a supply of fuel. We were first arrivals at the track, and soon the engine was resting on the rails with a fire started and the electric blower whirring.

The track is virtually 1000 ft. long in a large oval, with 2½ in., 3½ in. and 4¾ in. gauges. It is built on timber framing supported by timber uprights set in the ground. The rails are of steel strip, set on edge with spacers and bolts, and resting on wooden sleepers or ties. A narrow creek, dry in summer, cuts diagonally across the lot in a wide ditch several feet deep, so that one crosses its bed at a height of ten feet or so. Add to this the fact that the track tended to sway somewhat, because the sun's heat had dried out the ground and left a gap round each upright, and to a newcomer the situation had a certain element of excitement. But it must be admitted that Jack and the other boys treated it with complete sang-froid.

The track was first started in 1939 at another site, and used in 1940: it was re-erected at the present location in 1956-7.

Saved by a Ball Point Pen

However, we are getting ahead of ourselves—we left the Hudson raising steam, which progressed very well until ominous and growing whistle gave evidence of a leaky whistle-valve. Just the kind of thing likely to happen when a fellow wants his engine to make a good impression, of course!

So the fire had to be drawn and steam let down whilst Jack dismantled the erring valve, where the trouble turned out to be that the small return-spring had given up the ghost. Meantime, a member of the Royal Canadian Mounted Police had been passing in his patrol car, had seen us there with the engine, and full of interest had come to look at it. He it was who saved the day by dismantling his ball-point pen. The spring in this proved to be just the correct diameter; once Jack had cut it to length, it was a matter of minutes before the valve was back in place and steam was being raised once more.

It is pleasant to relate that the ingenious Mountie returned later in the afternoon, when he was off duty, bringing with him his young wife and little daughter. Like him they were fascinated by the activity, and they all spent a happy afternoon, not only watching, but riding behind the several locomotives. It seemed to me highly probable that this would not be their last visit to the Red River track!

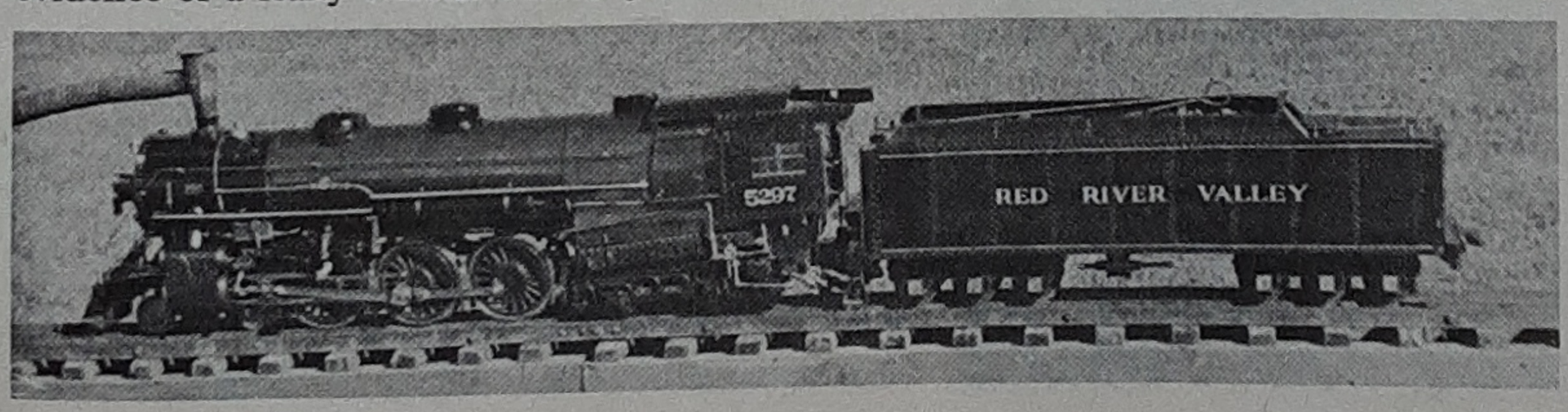
As mentioned already, the prototype of Jack Kerr's 4-6-4 was the New York Central's "Hudson" class; it was No. 5297, built by the American Locomotive Company at Schenectady. The model has cylinders of 1⅜ in. bore by 1⅞ in. stroke, fitted with slide valves with inside admission. It has actually been running since 1941.

Jack had a few warming-up laps with me as passenger, and then handed the Hudson over to me. It was a very enjoyable experience: the engine steamed freely with that big firebox, and firing was needed very infrequently. With only a light load and two big cylinders to haul it, the engine was well on top of its job, so one could run well notched up and with only a little regulator opening.

The only snag for me was the occasional sway of the track, especially when going over the creek, I found myself slowing here, not so much from the angle of personal danger, as from the possibility of damaging someone else's engine if one came off. But the engine was very sure-footed, and so confidence soon returned.

Other Arrivals

Meantime, Bert and Mrs. Maisey had arrived from Portage La Prairie, which is about fifty to



Raising steam in Jack Kerr's New York Central "Hudson" Class.

Jack Kerr cleans his Hudson, watched by Percy Henderson.

sixty miles away. Bert had brought along his very good 4¾ in. gauge "Pacific" of the Southern Pacific Railroad, and, assisted by his friend Art Dillon from the same town, it was not long before the "Pacific" was ready for the road.

This locomotive was built from castings supplied by Little Engines of California, and was in its second season of running. Bert has been working for four years on its construction, and still has more work to do on the details—the feedwater tank was occupying his attention at the time of my visit, for example. The cylinders of this engine are 1½ in. bore by 2 5/16 in. stroke, with slide valves.

An exceedingly good locomotive is the ¾ in. scale Canadian National Railway 4-8-4 ("Northern" class) which Paul Winslow of Winnipeg brought to the track. It was built by his late father Marvin Winslow, who made his own patterns and had castings made locally. The engine weighs 205 lb. and the Vanderbilt tender 60 lb. empty: the latter holds three gallons of water. The locomotive has been running for ten years, and Paul has also a 17/32 in. (2½ in. gauge) "Northern" built by his father which has been in use since 1942. Paul himself is currently building a Canadian National 2-10-2 in ¾ in. scale.

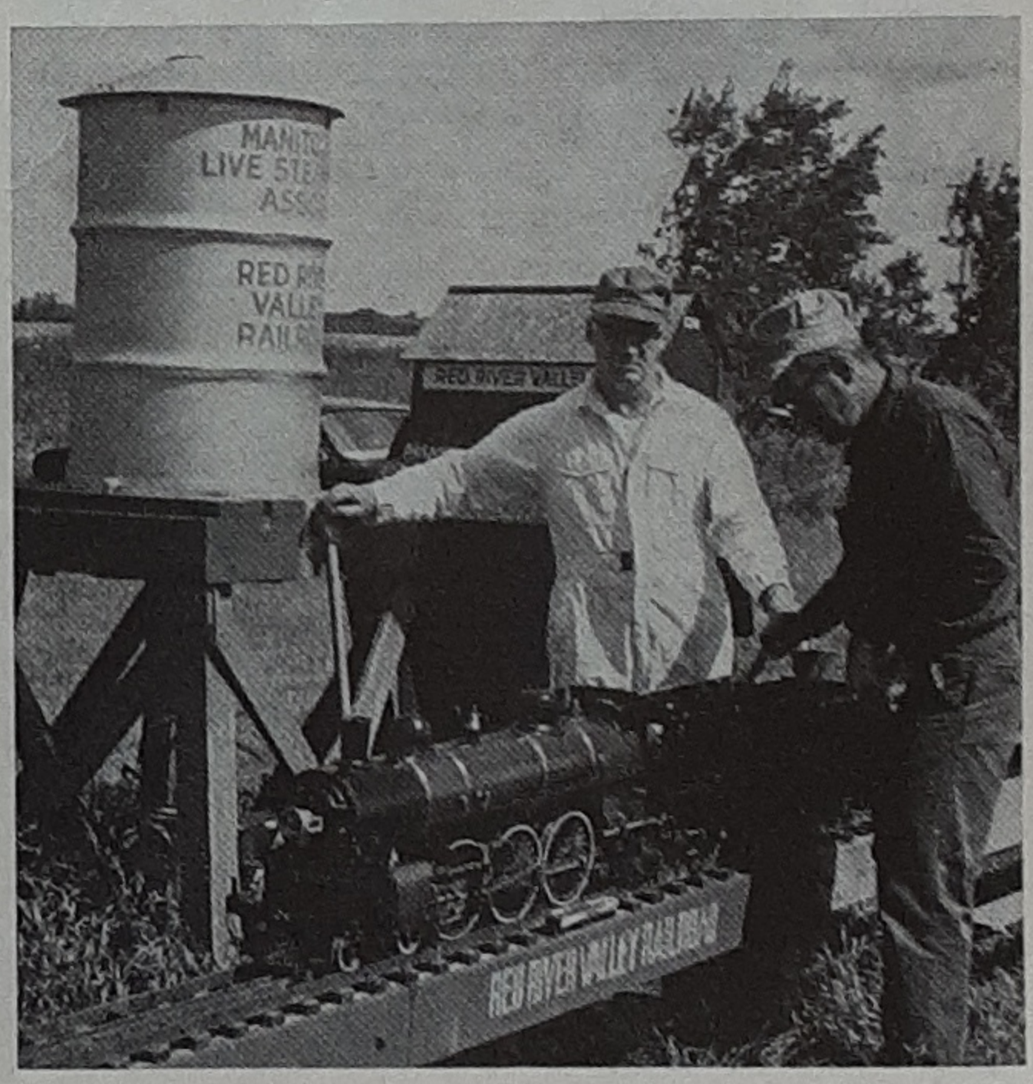
The prototypes of the "Northern" class were impressive engines, 94 ft. long overall with 73 in. drivers and 25½ in. by 30 in. cylinders. Baker valve gear was used. The firebox was 10 ft. 6 in. long (including a 4 ft. combustion chamber) and 8 ft. wide, and in working order the engine weighed 134 tons and the tender 125 tons. Working pressure was 250 p.s.i., and the tractive effort nearly 57,000 lb. They were built at the Montreal Locomotive Works in 1936.

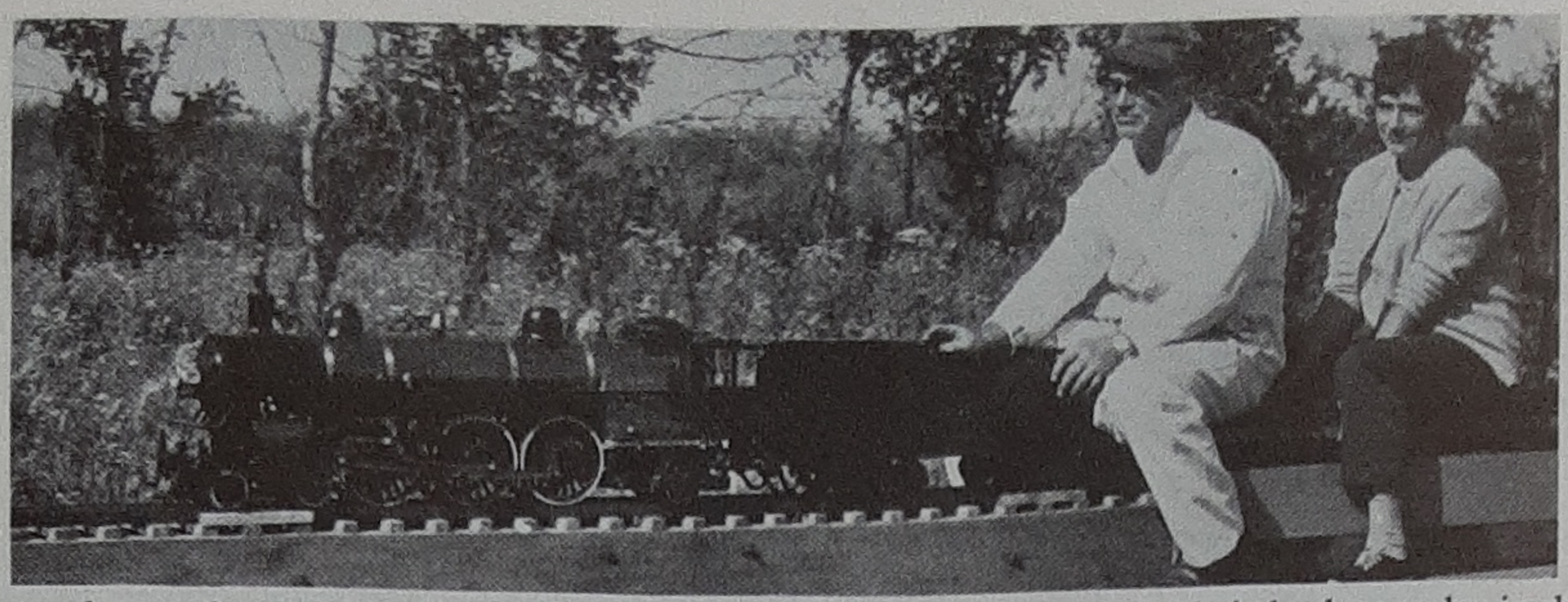
It is interesting to note that the Canadian National built more than 200 "Northern" class locomotives, commencing in 1927, and ending in 1944 with a batch of thirty, with detail improvements, but no drastic alterations as each batch of engines emerged. In contrast, the Canadian Pacific built only two 4-8-4's, magnificent beasts which, however, were not perpetuated. One of them is preserved at Regina, Saskatchewan.

Like Jack's "Hudson," Paul's "Northern" is a beautiful runner on the track, flying round easily for lap after lap well notched up and with a light throttle opening. True she only had a light load with Paul and the slim Mrs. Winslow, but it was evident that the engine would cope most efficiently with a heavy one.

Another New York Central "Hudson" came

Bert Maisey and his 5 in. gauge Southern Pacific 4-6-2 assisted by Art Dillon at the water tower.





Art Dillon driving the Southern Pacific with Mrs. Maisey.

on the track, and like the other engines it was a fine job and a good runner, though not carrying so much small detail as Jack Kerr's. It was built by Nels Backlund of Winnipeg, who had made his own wheel patterns, but had purchased the cylinder castings. Whilst the engine was on the track, Nels spent much of his time on the " back seat " whilst others drove—Jack Kerr for one had a good long spell.

Meantime, Clare Angers had arrived from Miami, Manitoba with his 3 in. scale Sawyer-Massey traction engine on a trailer behind his car. It was soon unloaded and steam was being raised, with the aid of a battery driven blower. There is no mains electricity at the track and so a car battery is usually used.

Before long the engine's own blower was turned on, and in a comparatively few minutes the engine was turning over, running free. When near to blowing off, Clare closed the throttle and engaged the flywheel clutch: then with a gentle opening of the regulator she was off, steaming in stately circles to much admiration.

A rather surprising thing to English eyes is that it seems the custom in North America to leave the governor belt in place all the time on a traction engine, even when travelling on the roads. I do not know if this is by law or by inclination, but with a single-speed engine (as most of them are) the throttling of the steam supply cannot be conducive to fast travelling from place to place.

Clare's engine was nicely built and finished, painted in bright green with red wheels, which looked well with the polished brass and bright steel of boiler bands and motion parts. It is built from the prototype, which Clare used to own, and patterns for the cylinder, engine frame, and other parts were made by the builder. The wheel rims were made from steel tube and the hubs were turned from the solid. There are eleven 1 in. dia. flues in the arc-welded boiler.

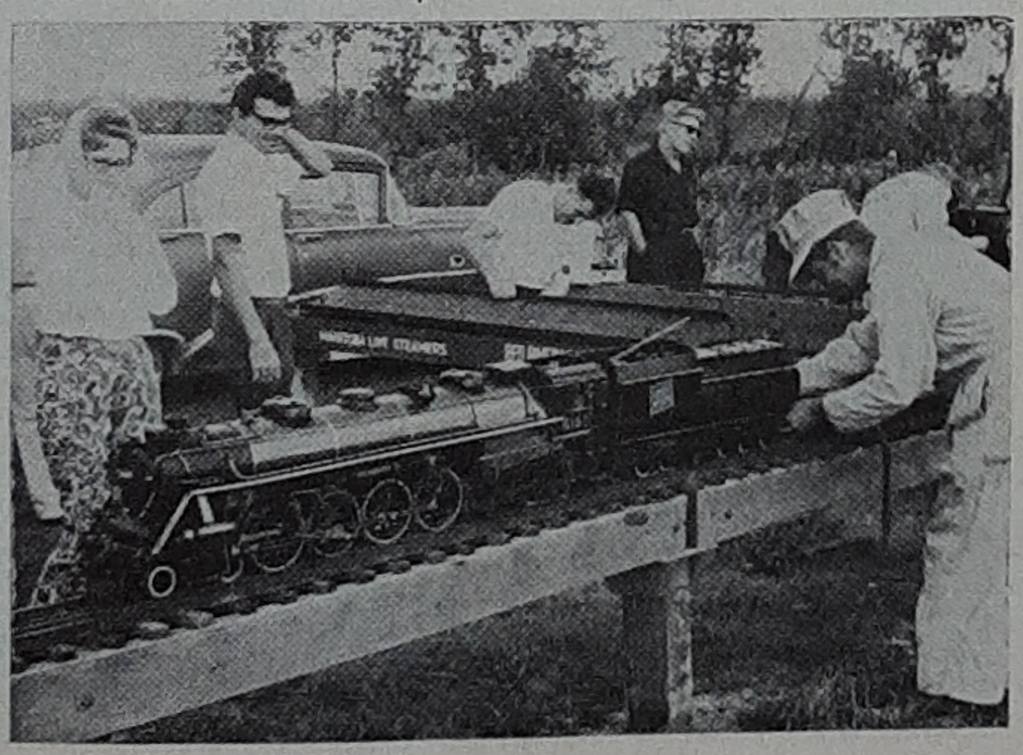
Back to the track now, where Jack Collier was running a British 0-4-0 industrial saddle-tank engine. This actually was built in England by Charlie Nicholson, who brought it over to Winnipeg when he lived there for a time. When he returned to England he disposed of the engine to Jack. It looks rather high-built, but runs very well, with its outside Stephenson valve gear. In this picture, by the way, may be seen the young Mountie in mufti, but his wife and small daughter were mostly hidden by Mrs. Maisey. Note also the " grain elevator " in the background, a scenic asset which is used for storage.

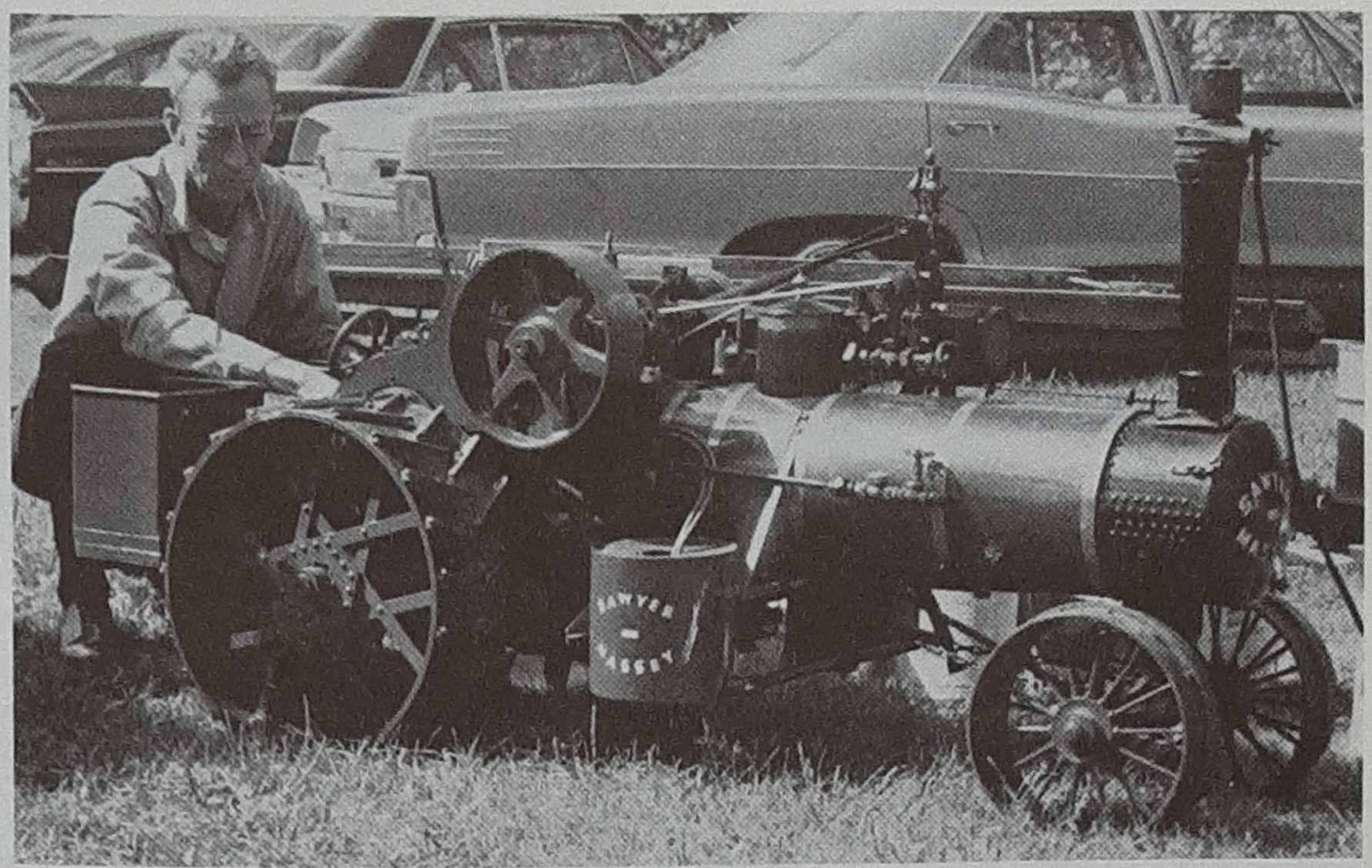
Another British built engine was the *Britannia* owned by Ted Cotton (Fig. 13) who purchased it from Cecil Moore of Myford fame. Cecil has told me that he himself purchased the engine, but as it became " surplus to requirements " he let it go to Ted, who wanted an engine to be running whilst he works on his own chef d'oeuvre. This is a New York Central " Hudson " like Jack Kerr's and since Ted has been working ten years on the engine, it should be a beauty when completed.

Finally, a very nice *Britannia* in blue livery, built in 3½ in. gauge by Bob Robson, was bowling round the track and looking attractive in the late afternoon sun, as Jack and I got ready to leave. I certainly had enjoyed my day with the Manitoba Live Steamers, and more was to come.

Jack Collier is the President of the club, and he

Paul Winslow with his ¾ in. scale Canadian National 4-8-4.





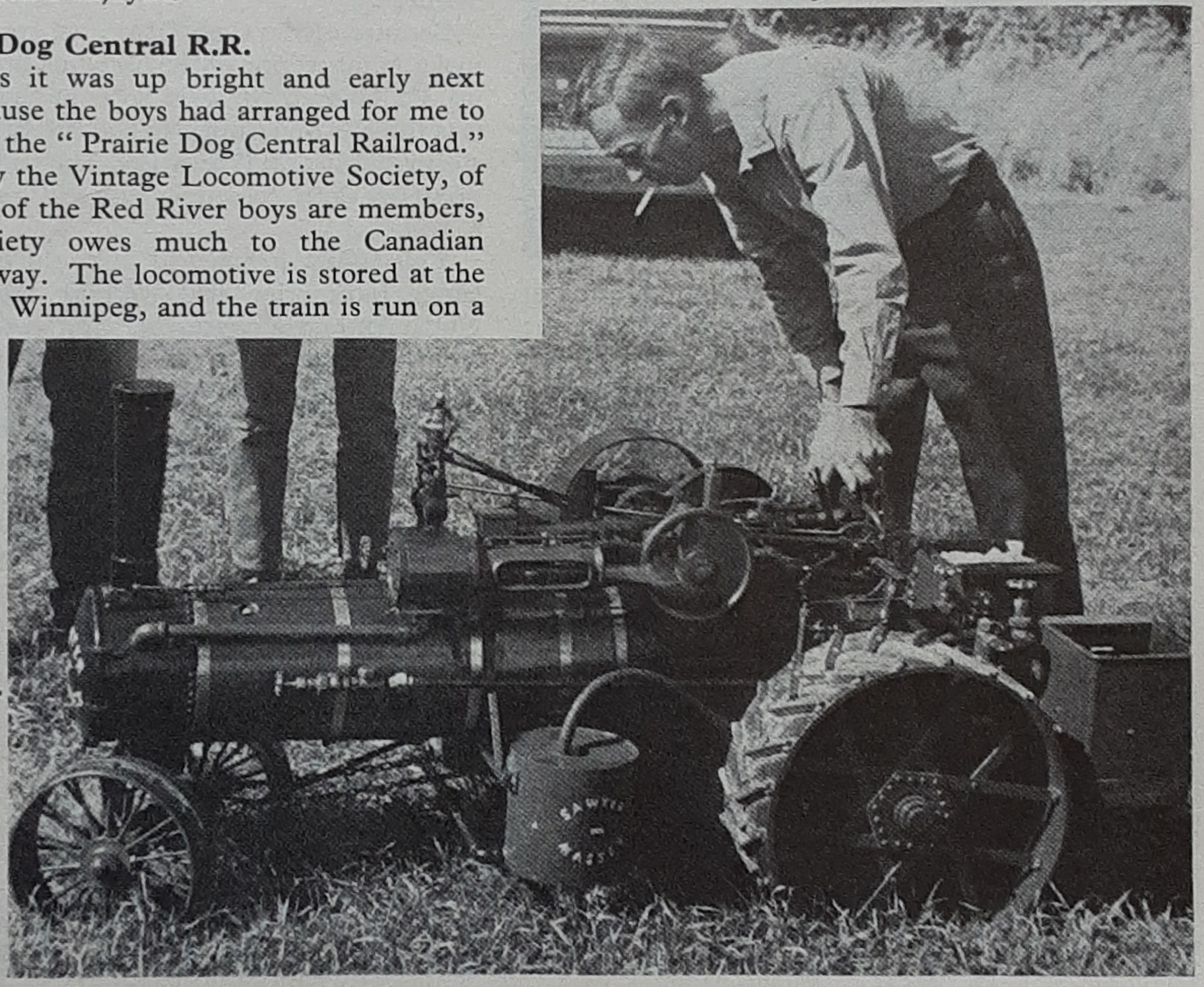
Clare Angers raising steam in his 3 in. scale Sawyer-Massey traction engine.

and his good lady had arranged a party in my honour later in the evening. This carried on well into the small hours of the morning, with much talk of steam and steam engines, and many films and slides seen—not to mention the liquid and other refreshments enjoyed.

The Prairie Dog Central R.R.

Nevertheless it was up bright and early next morning, because the boys had arranged for me to have a trip on the " Prairie Dog Central Railroad." This is run by the Vintage Locomotive Society, of which several of the Red River boys are members, and the Society owes much to the Canadian National Railway. The locomotive is stored at the C.N. depot in Winnipeg, and the train is run on a length of C.N. track out of Winnipeg, which was part of the Grand Trunk Railroad before nationalisation which created the C.N.R. in 1923 out of many smaller constituents including the Grand Trunk.

Well before 8 a.m. Jack and I were on our way,



The engine side of the 3 in. Sawyer-Massey.

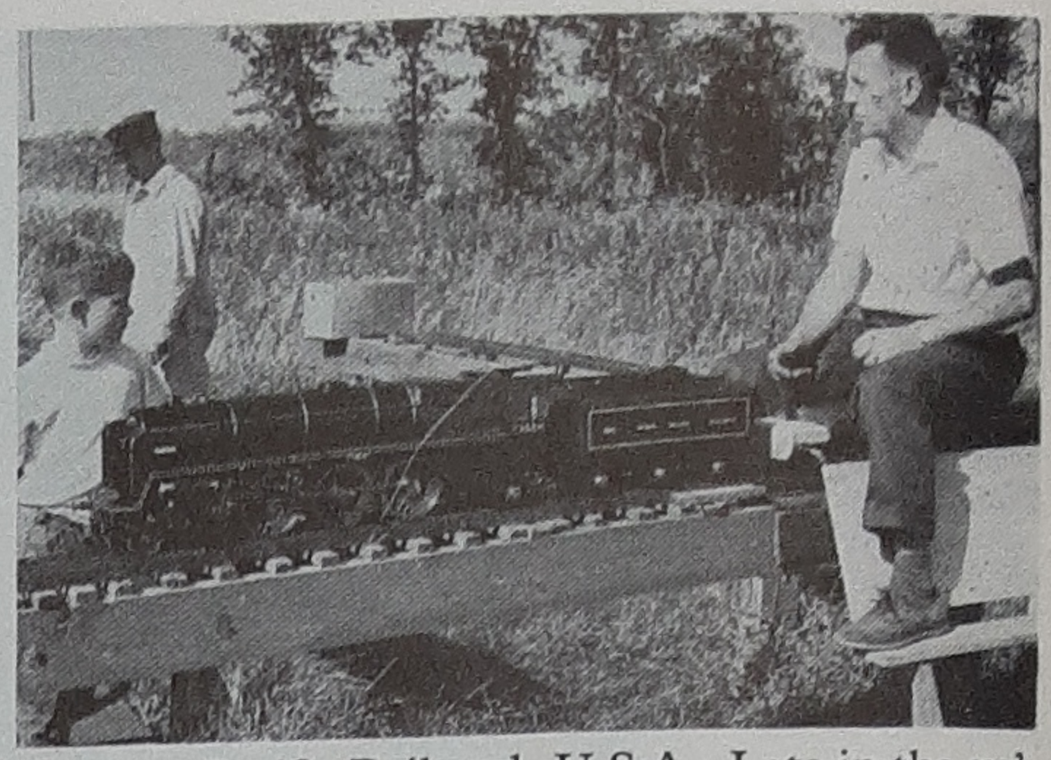
Jack Collier hauls Mrs. Maisey with his 0-4-0 locomotive.

Below: Ted Cotton with his Britannia, purchased from Cecil Moore.

Above right: 3½ in. gauge Britannia built by Bob Robson.

making a detour to pick up Carl Hansen, who at the age of 90-plus is still an active member of the Red River boys and a first-class craftsman. On our way we paused to see the veteran 4-4-0 locomotive, pioneer of the Canadian Pacific, the *Countess of Dufferin*, which is preserved in Winnipeg.

As Hamilton Ellis tells the story in "The Pictorial Encyclopaedia of Railways," this engine was built by Baldwins in 1872 and acquired by the

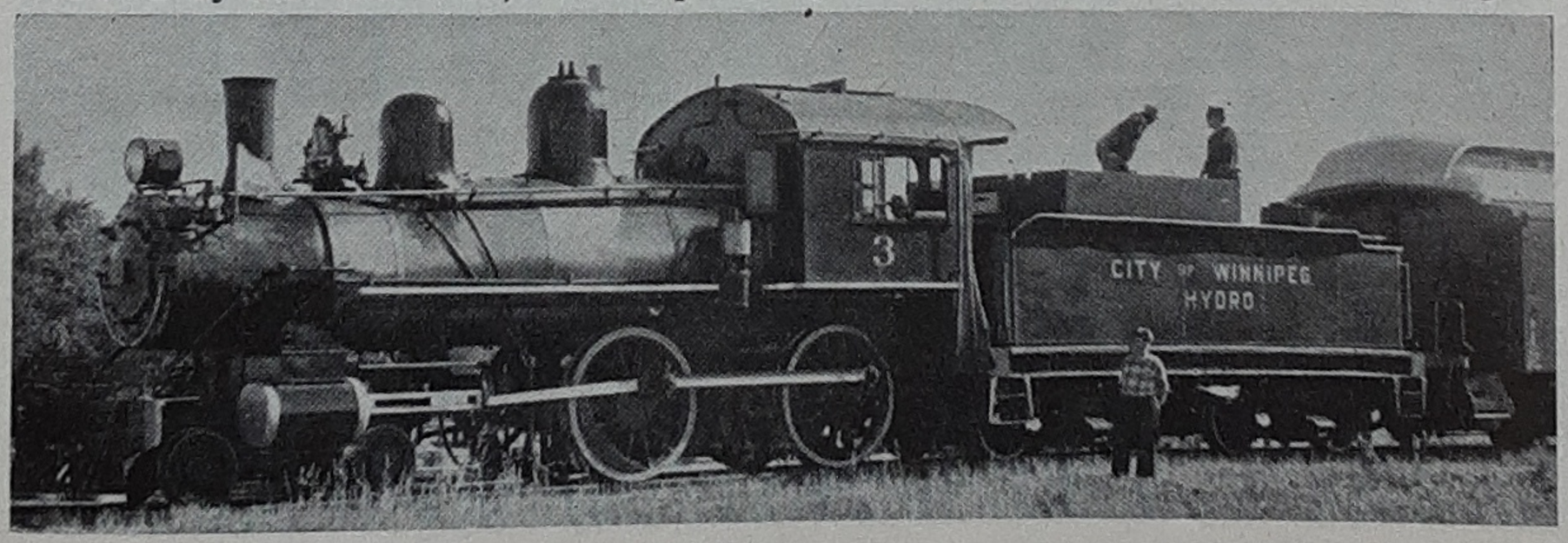


Northern Pacific Railroad, U.S.A. Late in the 70's the contractor Joseph Whitehead bought her, and used her on Government contracts in Manitoba. In 1881 he brought her by steamboat up river to Winnipeg and lettered her "Canadian Pacific." She was already his No. 1. The C.P.R. bought her in 1883, and she became their No. 151 until 1897, when a lumber company bought her. The C.P.R. bought her back in 1910, and, says Ellis, "Then and thereafter she became the monumental engine she still is." Besides showing her as she is now, this excellent book gives a historical picture of the engine being unloaded from the steamboat at Winnipeg.

Because of the time factor, we could not stop to make an inspection of the *Countess*, and after picking up Mr Hansen we were soon at the depot. Here was the 4-4-0 gleaming in the bright sunlight, with steam nearly at full pressure. She had been coupled up to her three passenger cars and was almost ready to roll.

This engine is believed to be the oldest standard gauge locomotive still working regularly in the North American continent. She was built by Dubs and Co. (later part of the North British Locomotive Co.) in Glasgow in 1882 for the C.P.R., and ran between Thunder Bay and Kenora, Ontario. In 1918 she was acquired by the Winnipeg City Hydro —that is, the city's electrical authority—and used on their own railroad from Lac du Bonnet to Pointe du Bois, Manitoba, a run of 25 miles.

To be continued



Prairie Dog Central RR 4-4-0, built in Britain in 1882.

Renovating a Myford Lathe

by J. A. Radford

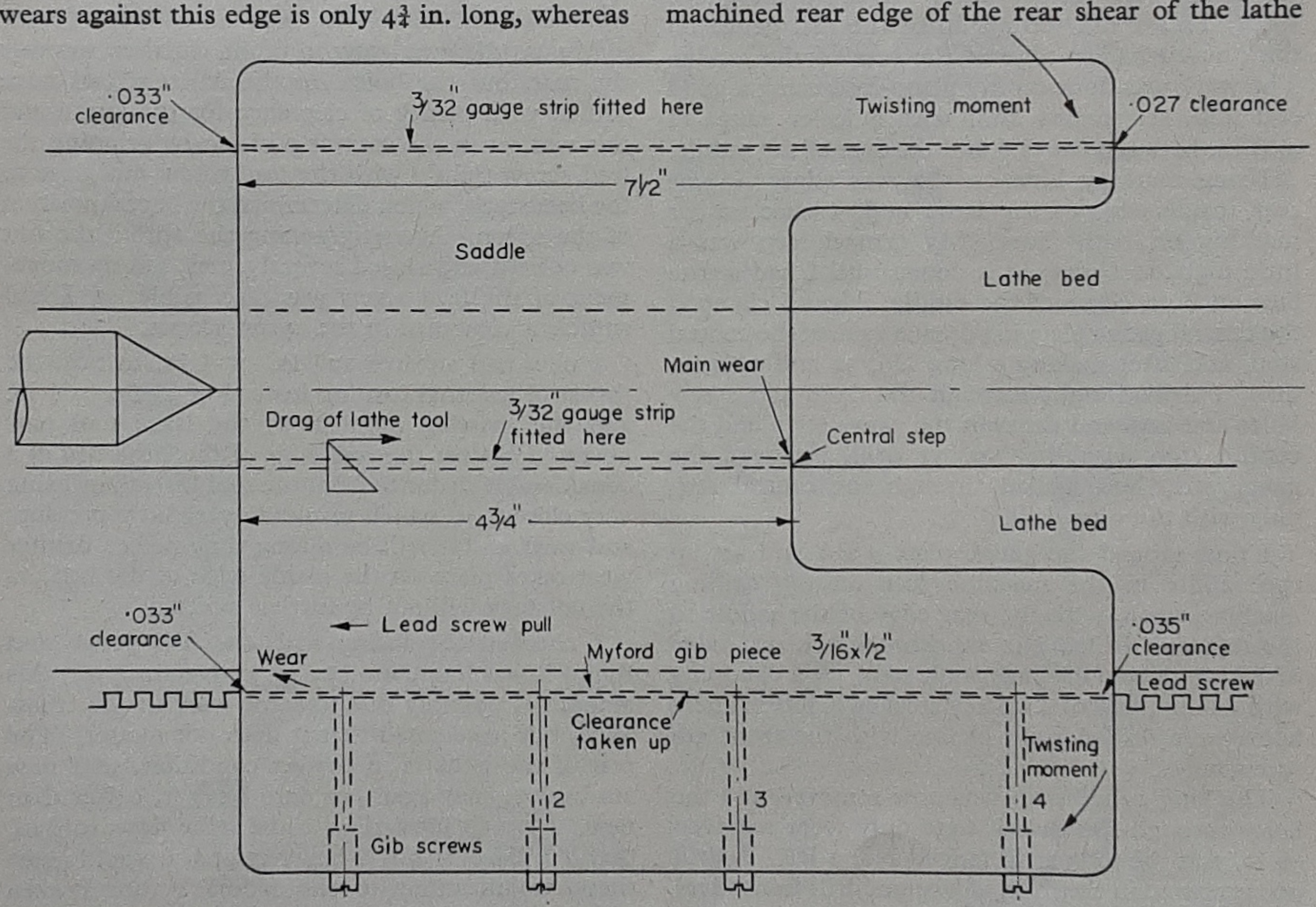
I RECEIVED my Myford Super 7 B long bed lathe in June 1962 and it has been in constant use since, mainly on work that could be considered a little heavy for this size of lathe perhaps; but it has given me wonderful service. It has been used for work much more varied than straight turning as some of my articles will indicate. It has made me a ½ in. drilling machine, a shaper and a power hacksaw and converted a planer to a planer-mill, and all those fixtures and more, that have been published in M.E.

Lately however the saddle, when adjusted correctly close to the chuck, was too tight further along the bed and facing has developed a convex tendency. On measuring the amount I found that it faced .001 in. per inch of cross travel convex. Adjusting the saddle to slight stiffness, I found I could still " rotate " the saddle slightly but visibly.

The inside edge of the front shear of the lathe bed takes the full thrust and wear when external turning and the inside step of the saddle which wears against this edge is only 4¾ in. long, whereas the gib strip at the front of the saddle which takes the wear when boring, is 7½ in. long. This design is done no doubt to conform to the modern idea of the narrow guide principle, but with this design of lathe saddle, in my humble opinion, it is not very good.

My drawing will show what takes place under the side thrust of a normal cutting tool when the saddle is drawn along by the lead screw. The right-hand grub-screw at the front of the saddle adjusts against nothing at all, and most of the wear takes place on the right-hand end of the central step under the saddle and the left-hand end of the gib strip, resulting in convex facing, swivelling of the saddle due to convex wear on this central step and wear on the inside edge of the lathe bed, allowing looseness of the tailstock when close to the chuck.

The amount of wear on the bed was barely measurable so the main wear must have been on the inside step of the saddle. I was now faced with the decision to: 1. Buy a new lathe, 2. Buy a new bed and saddle, 3. Repair the existing lathe. As the rest of the lathe was in excellent condition I decided on the last possibility. With the apron removed and the saddle on the unused right-hand end of the bed, I found that the space between the machined rear edge of the rear shear of the lathe



RENOVATING A MYFORD LATHE

bed and the machined but unused inside rear vertical face inside the saddle measured .033 in. at the left hand end and .027 in. at the right hand end, a difference of .006 in. in 7½ in. length. Here then was proof of the convex facing due to wear and that the original machining of the saddle was correct. It seemed a pity to have a perfectly good machined face on the rear edge of the bed that is not used for any purpose at all.

I found the gap in front of the saddle gib strip, where wear had been taken up from time to time, now showed a space of .033 in. at the left-hand end and .035 in. at the right-hand end. All of these measurements were taken at the right-hand end of the bed which was almost unused and would have been accentuated close to the chuck. Removing the saddle, the curved wear on the central step was very apparent.

I had a piece of 3/32 in. ground gauge plate, so I made one gib piece 7½ in. long × ½ in. wide and one piece 4¾ in. long × $\frac{9}{16}$ in. wide. Now if I machined the inside face of the rear edge of the saddle, by taking up all the space between the front gib strip and the saddle, I would need to machine out .034 in. to take the gauge strip and leave a couple of thou clearance and remove .062 in. from the centre step face to allow for the other gauge strip. This I did setting up to the dial gauge on the unused inside edge of the rear of the saddle. The work was done on my plano-mill using a good end mill, set to just clear with a feeler gauge of .002 in. between the end and the face of the saddle.

Using marking blue on the rear edge and the rear inside edge of the lathe bed, I checked for marking on both faces. My central step was a little high, so I scraped it down until I had a true face on both edges of the saddle. Next I clamped the central gauge plate in position against the central step, and after making a long No. 32 and 9/64 in. drill, I drilled right through the front gib screw holes and into and through the gauge strip and the central step with the No. 32 drill, removed the gauge strip and drilled through the central step only with the 9/64 drill.

I now tapped the gauge plate 4 BA and set up the saddle in the machine vice on the drilling machine again, with the rear edge of the saddle to the top and drilled No. 24 through the rear edge of the saddle and the long gauge strip, after clamping with a long piece of ¾ in. key steel as before. These holes were drilled right in line with the front gib screw holes.

The long gauge strip was now removed and the holes through the saddle edge only were redrilled $\frac{3}{16}$ in. and the long strip tapped No. 2 BA. A drill was prepared in the form of a spigot drill from silver steel that would go through the $\frac{3}{16}$ in. holes and the curved face of the central step was counterbored to take the heads of the No. 4 BA Allen screws which hold the gauge strip to the central step.

I now spread a thin layer of Araldite on the central step and the inside face of the rear of the saddle and a thin layer on the gauge plate strips and clamped them both up overnight using the ¾ in. key steel with the Allen screws in place but not tightened. In the morning the Allen screws were fitted, three No. 4 BA through the central step and four No. 2 BA through the rear edge of the saddle, and tried again with the marking blue. The marking was not perfect but was showing quite well so with the end of a fine file, I "scraped" the surfaces of both strips to very nearly 100 per cent marking on the unused right hand end of the bed.

I then fitted the front gib strip and adjusted carefully, first No. 2 gib screw, then No. 1 and No. 3 simultaneously and lastly No. 4, which now had something to adjust against. I could now slide the saddle beautifully the full length of the bed by hand and there was absolutely no movement anywhere of the saddle close to the chuck or at the extreme right hand end of the bed. I was able to remove one layer of the laminated shim stock from the underneath plates under the saddle, and this fortunately made no difference to the feel of the saddle, although all vertical play was removed.

My saddle was now 1/32 in. further towards the rear, but the holes for the Allen screws were drilled with plenty of clearance for the apron and this was set in the correct position by gripping the lead screw tightly with the lead screw nut close to the headstock, which determined the lateral position of the apron. After tightening the apron, the nut was opened and closed several times, but no movement of the lead screw was discernible, so I had sufficient clearance in the apron screws.

I now had an area 12¼ in. × ½ in. to take the thrust of external turning instead of 4¾ in. × ½ in. and the twisting moment of the lathe tool now operated against the rear edge of the lathe bed at a considerable distance from the tool instead of being very close to it, which results in very little pressure and wear and it will be a long time before further wear takes place on the inside edge of the bed, so the tailstock will not be further affected.

I checked the facing with the dial gauge and found it was less than .001 in. convex in 4 in.; this amount is possibly due to some wear in the cross-slide, but is so small that it does not matter. The rest of the lathe is in perfect condition, so I now am back to new again, or dare I say it, better than new. I am so pleased with the lathe now, indeed, that if I did ever buy a new Myford, I would make these modifications to the saddle before I even started to use the lathe. ▣

A MILLING JIG

by J. Bishop

THE MILLING JIG to be described may be used for a number of purposes, but mainly the forming of square or hexagon heads on screws, bolts or plugs. The sizes shown on the drawing are to enable the jig to be used on a Myford ML7 or Super 7 lathe, but may be modified to suit any lathe. As shown it can be bolted direct to a vertical-slide or held in a machine vice fitted to the vertical-slide.

The material used for all the components of the jig with the exception of the socket screws is mild steel.

The main block in which the turret rotates is machined out of a piece of 4 in. × 1½ in. × 1 in. steel. The ⅛ in. deep rib and the two ⅜ in. dia. holes enable it to be bolted direct to the vertical-slide. The hole for the turret is bored out ¾ in. dia. and counterbored 1 in. dia. × ¼ in. deep for the turret retaining plate.

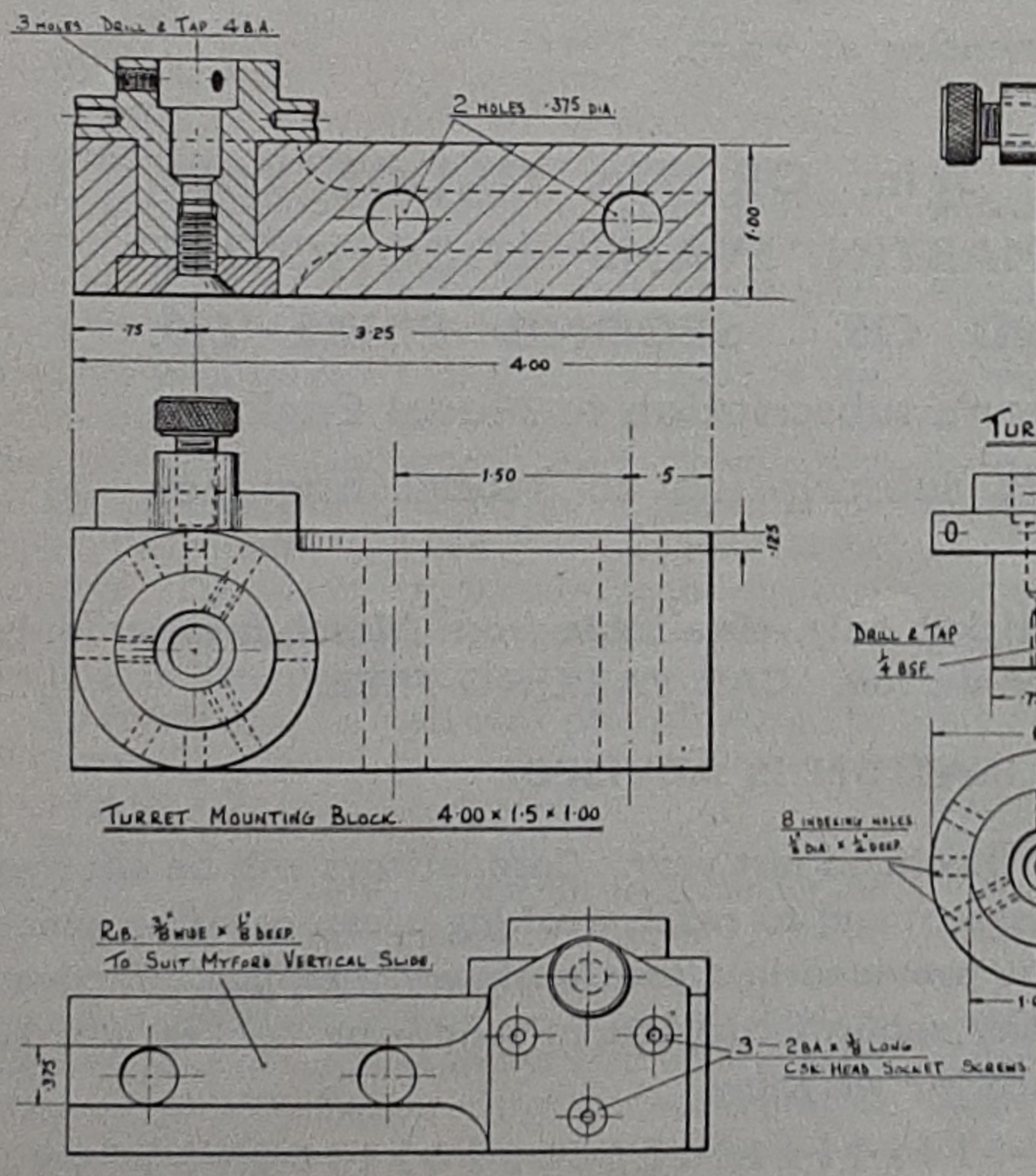
The turret can be machined from 1½ in. dia. steel bar to the dimensions shown. The 5/16 in. dia. hole may be drilled as deep as one wishes, but leave enough metal in the bottom of the turret for the ¼ in. BSF retaining screw.

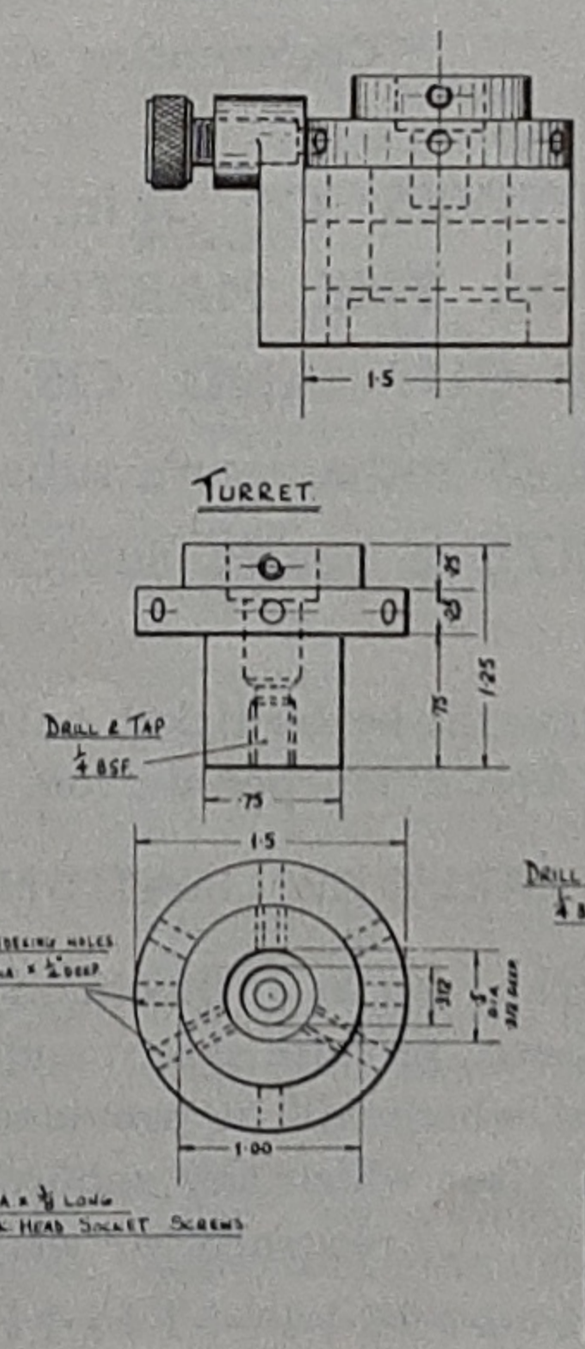
The eight ⅛ in. dia. × ¼ in. deep indexing holes are drilled around the larger diameter of the turret to enable one to machine four or six flats on the workpiece. The ½ in. dia. × 5/16 in. deep enlargement of the 5/16 in. dia. hole at the top of the turret is to enable a button, with a suitable threaded hole in it, to be fitted. The button is held in place during the milling operation by three 4 BA socket grub screws which fit in the three tapped holes around the top of the turret.

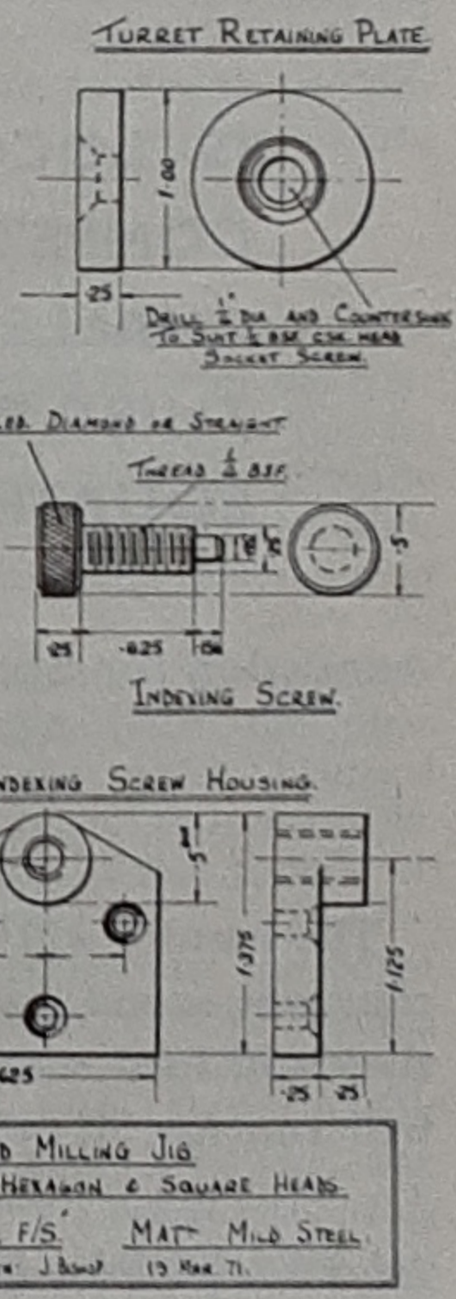
The turret is held in place in the block by a ¼ in. BSF countersunk head socket screw and the turret retaining plate. This retaining plate is made 1 in. dia. × ¼ in. thick material, drilled and countersunk to suit a ¼ in. BSF countersunk head socket screw.

The index screw housing is screwed to the main block as shown. It can be machined out of a piece of ½ in. thick mild steel plate to the dimensions given; the ¼ in. BSF thread is put in whilst the housing is still in the four-jaw chuck. The three countersunk holes are drilled and countersunk to suit 2 BA countersunk head socket screws.

The indexing screw can be turned from ½ in. dia. bar to the dimensions shown. The head may be knurled with a diamond or a straight knurl to suit whichever type knurling tool one has. The ⅛ in. dia. × 5/32 in. long plain portion on the end of the screw, which fits in the ⅛ in. dia. holes in the turret, may be case hardened.







INDEXED MILLING JIG
FOR HEXAGON & SQUARE HEADS
SCALE. F/S MAT. MILD STEEL
DRAWN J. BISHOP 13 MAR. 71.

In use, the jig is bolted to the vertical-slide or held in a machine vice on a vertical-slide. This enables one to obtain any length of flat easily, without resorting to packing blocks or strips. An embryo screw, bolt or plug is screwed into a suitable button. A number of buttons can be made up to ½ in. dia. × $\frac{5}{16}$ in. thick, drilled and tapped to suit the workpiece. The button is then placed in the ½ in. enlargement in the top of the turret and held in place by the three 4 BA socket screws. When one has decided the size of hexagon or flat one wants, the first flat is end milled with the turret locked in place with the indexing screw, then the rest of the flats are milled by rotating the turret to the appropriate position and locking with the indexing screw.

A further use of the jig could be for drilling tommy bar holes in piston or valve rod gland nuts.

THIRD INTERNATIONAL MODEL LOCOMOTIVE EFFICIENCY COMPETITION

THE COMPETITION WILL BE HELD ON THE BITTERNE PARK TRACK OF THE SOUTHAMPTON & DISTRICT SOCIETY OF MODEL ENGINEERS *(by kind permission of the Committee of the Society)*

ON SUNDAY, JULY 18th

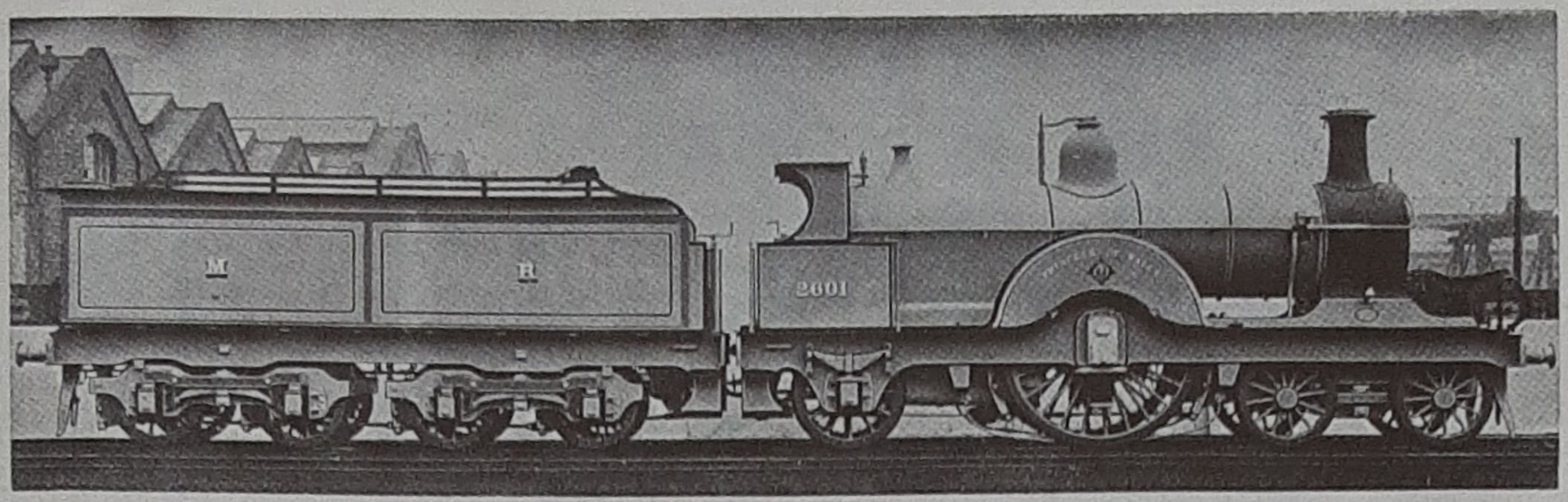
Commencing at 9 a.m.

15 LOCOMOTIVES OF 3½ in. OR 5 in. GAUGE WILL COMPETE FOR THE MARTIN EVANS LOCOMOTIVE CHALLENGE CUP AND £25. SECOND PRIZE £10. THIRD PRIZE £5 and a year's subscription to Model Engineer FOURTH PRIZE a year's subscription to Model Engineer

Admission for Spectators will be by ticket only, obtainable from *Model Engineer* only ADMITTANCE 15p per person. CAR PARKING FREE.

EARLY APPLICATION IS ADVISED.

The results will be worked out as at Blenheim last year. Competitors will be allowed charcoal, wood, paraffin, etc., to raise steam and to reach working pressure, after which they will feed steam coal, which will be provided in a previously-weighed bag. Engines will run for 30 minutes, after which any unburnt coal left in tender or bunker will be returned for weighing.



PRINCESS OF WALES

5 in. gauge Midland "Single," described by Martin Evans

Part 19

Continued on page 446

SINCE THE CAB VIEW of my "Single" was published (page 438, May 7) I have made a couple of small alterations. By an oversight, the syphon pipe for the pressure gauge had been drawn incorrectly, there being practically no depth of pipe underneath the gauge. Taking the pipe in a wider sweep not only looks better, but allows for a deeper pipe, giving more protection for the gauge.

The other alteration concerns the whistle valve. Nothing is more annoying than a whistle which jams in the open position, (it is almost as bad as a sticking car horn!) while a minor annoyance is scalded fingers when operating the whistle valve. I have therefore abandoned the traditional type, and have substituted one having a "push-button" operation, the "button" part of the valve being permanently retained inside the body of the valve by a 12 BA cheesehead screw, (which should be made of stainless steel). Between the head of this screw and the ball, we have a short length of $\frac{1}{16}$ in. dia. stainless steel and around this is placed a ring of soft packing, which should not be packed in too tightly; alternately a small "o" ring would be suitable. The amount of packing (or the diameter of the "o" ring) should be such that there is at least $\frac{1}{16}$ in. free movement.

To ensure that the ball seats properly when the "button" is released, a 22 s.w.g. stainless spring—just under 5/32 in. O/D—is used.

Returning to the "manifold," this has been made as high as possible, to ensure dry steam for the injectors, and its main parts consist of a vertical member turned from $\frac{5}{8}$ in. A/F hexagon bronze, and a cross member made from $\frac{7}{16}$ in. square brass—note that the rear side of this is filed off at a slight angle, so that the various valves screwed into it lie on a sloping plane.

The two steam valves for the injectors, the steam valve for the sanding gear, the whistle valve, and the union connections for the blower, the pressure gauge and the steam brake are all screwed into the body of the manifold and sweated over with soft solder—they can thus be easily removed without damaging them.

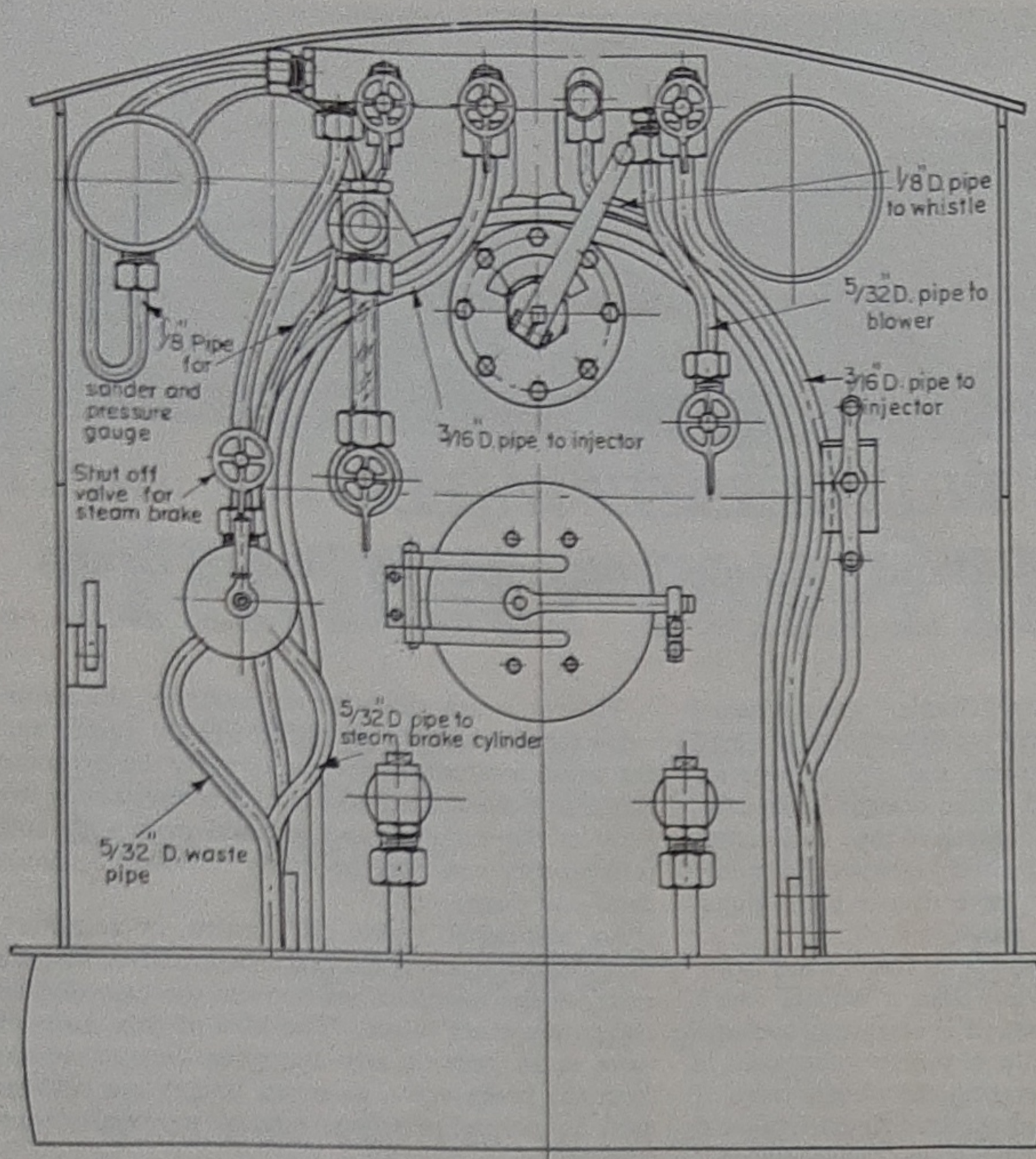
An additional "shut-off" valve is required, which is placed immediately above the driver's brake valve, as the manifold has become too crowded to accept any more valves. The idea of this shut-off valve is to prevent any annoying leak of steam from the brake valve, as steam brakes are seldom used in normal running, not in my experience anyway.

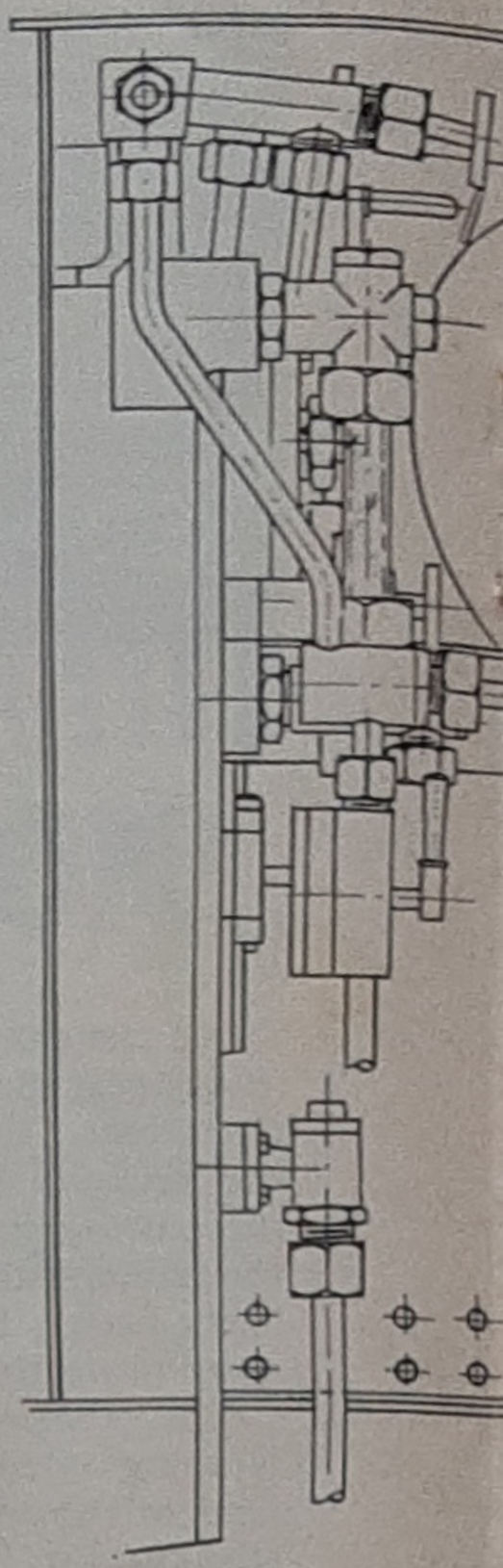
Spectacle plate

I thought at first that the spectacle plate could be made in one piece and pushed on from the rear. But the manifold cannot be screwed home into its bush on the top of the firebox with the spectacle plate in position, so it is essential to make this plate in two pieces, putting the join on the centre-line of the engine.

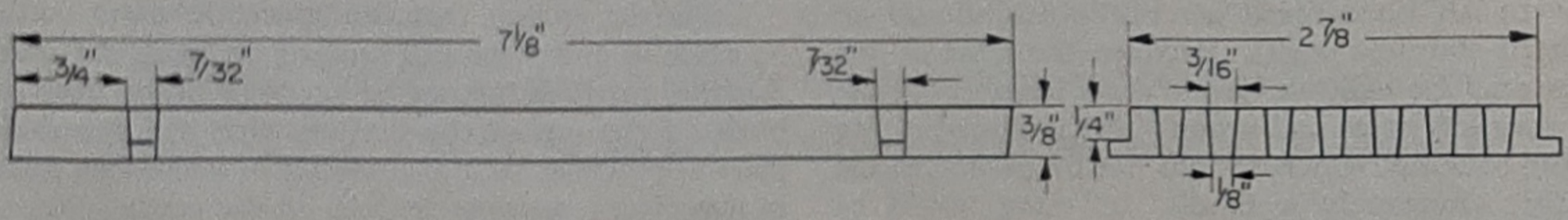
Although the essential dimensions of the spectacle plate are given here, don't forget that this plate fits over the lagging and cleading which is carried right to the rear end of the firebox, so it would be advisable to leave the finishing of this plate until after the boiler has been lagged.

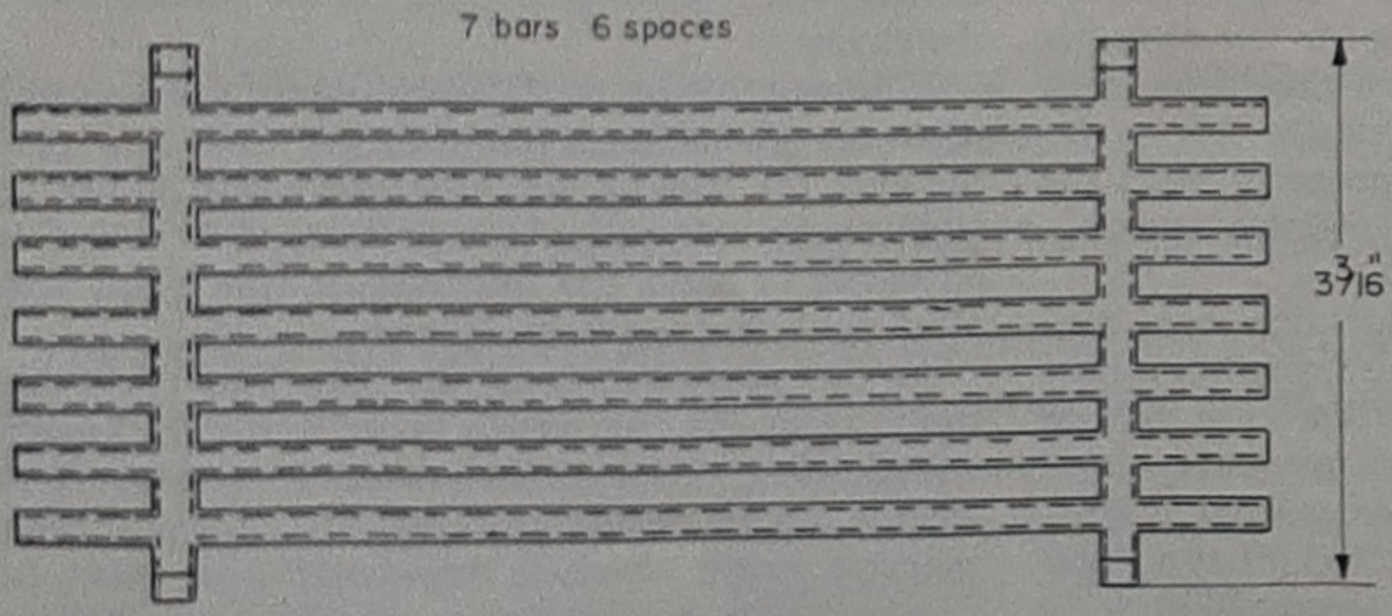
As the smokebox is $4\frac{3}{4}$ in. dia., and the boiler barrel $4\frac{1}{2}$ in. dia., we have $\frac{1}{8}$ in. all round for lagging and cleading. Some builders use asbestos sheet for lagging, others use asbestos string. I have a ball of asbestos string which is nominally $\frac{1}{8}$ in. dia., but after winding this tightly round a boiler and fitting 26 s.w.g. cleading, the total thickness does not


1/8" D. pipe to whistle
5/32" D. pipe to blower
3/16" D. pipe to injector
1/8" Pipe for sander and pressure gauge
3/16" D. pipe to injector
Shut off valve for steam brake
5/32" D pipe to steam brake cylinder
5/32" D. waste pipe

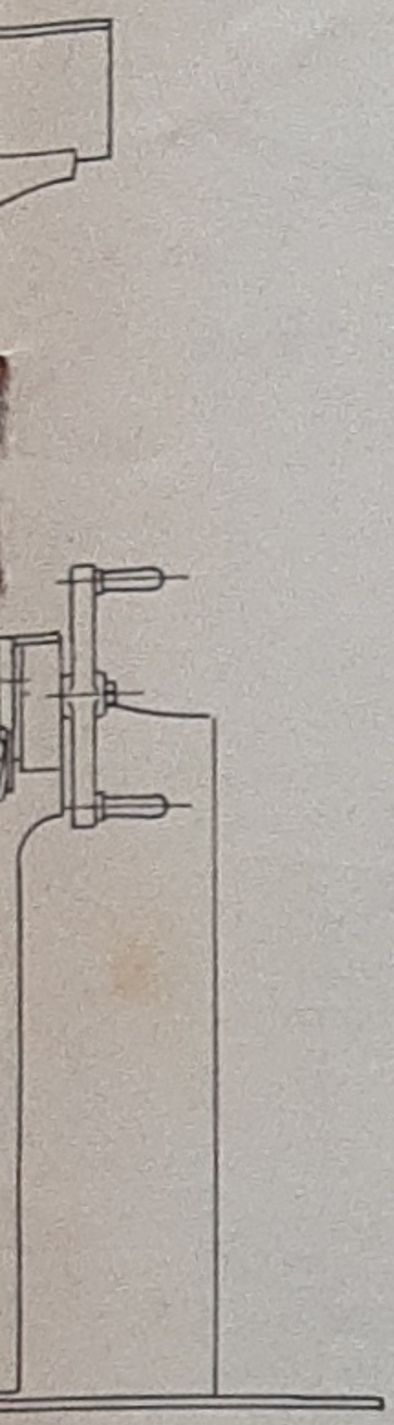


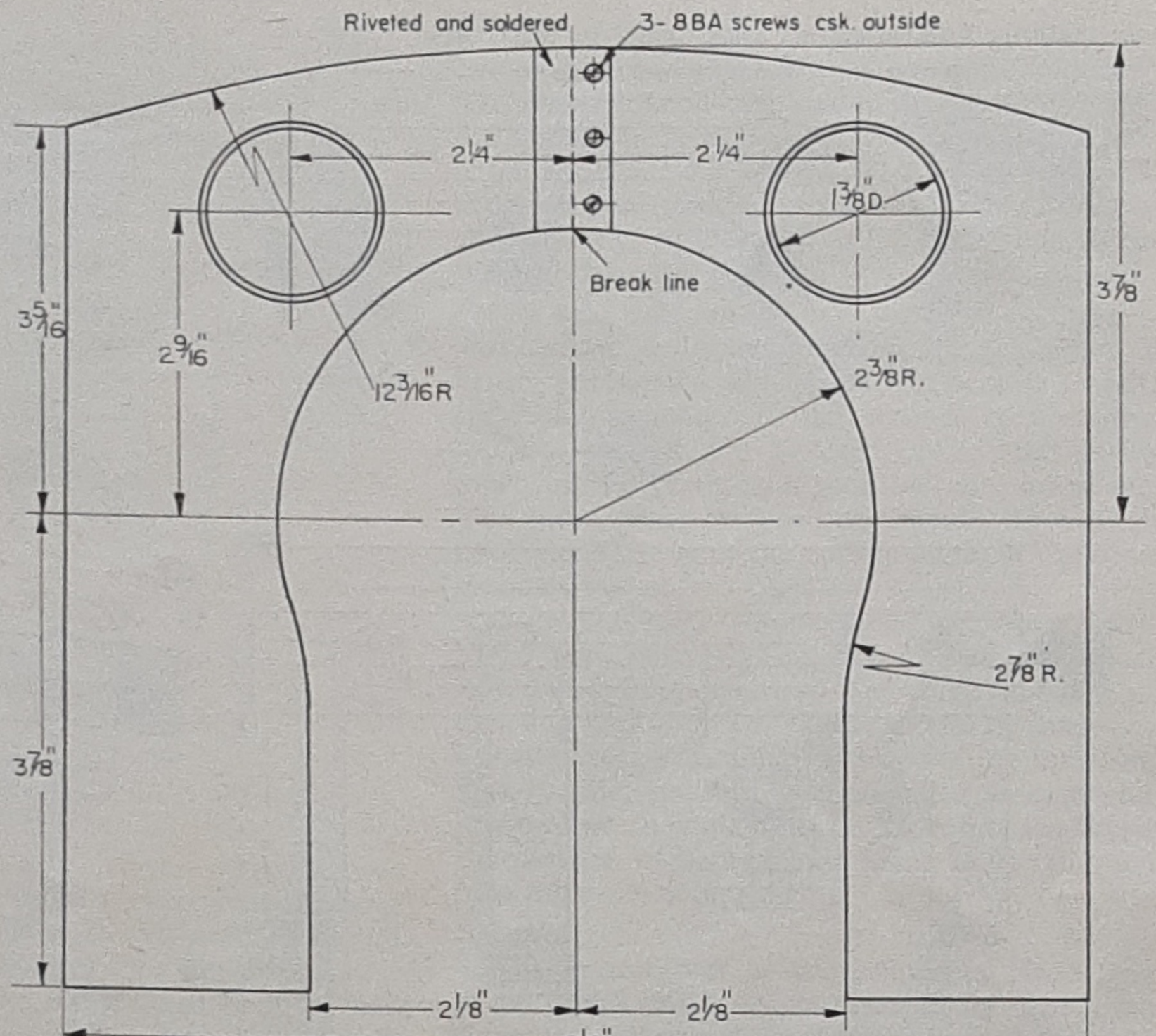
CAB VIEW SHOWING BACKHEA





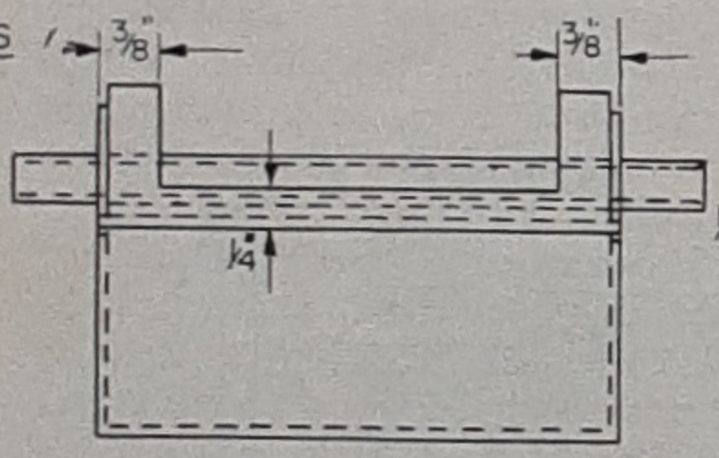
GRATE CAST IRON

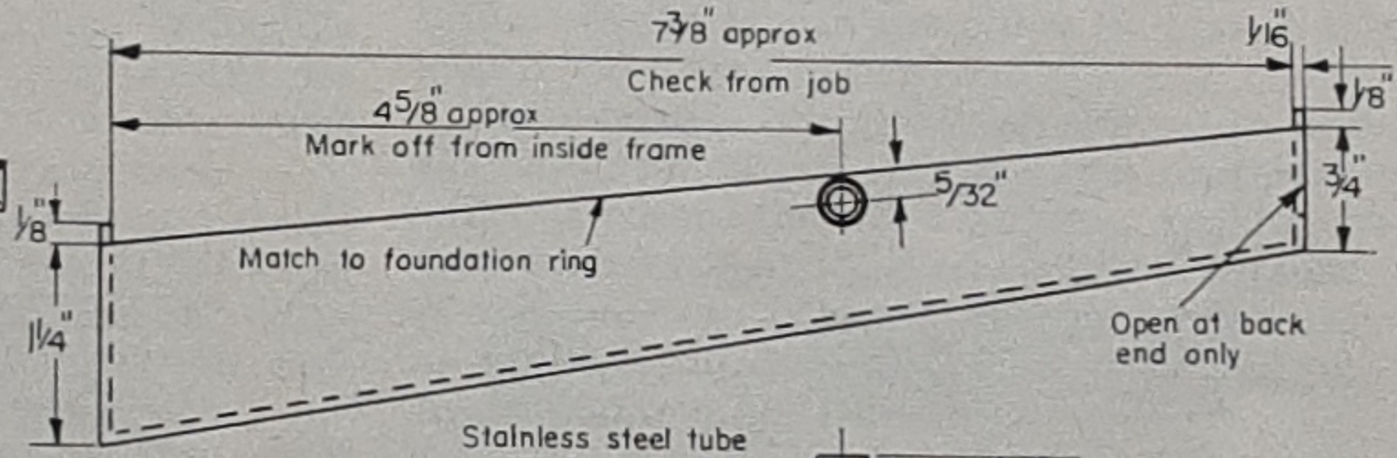


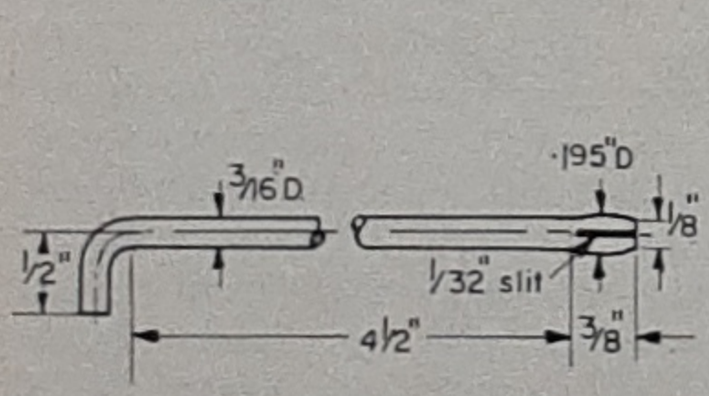


SPECTACLE PLATE 1/16" BRASS SHT (MADE IN TWO HALVES)

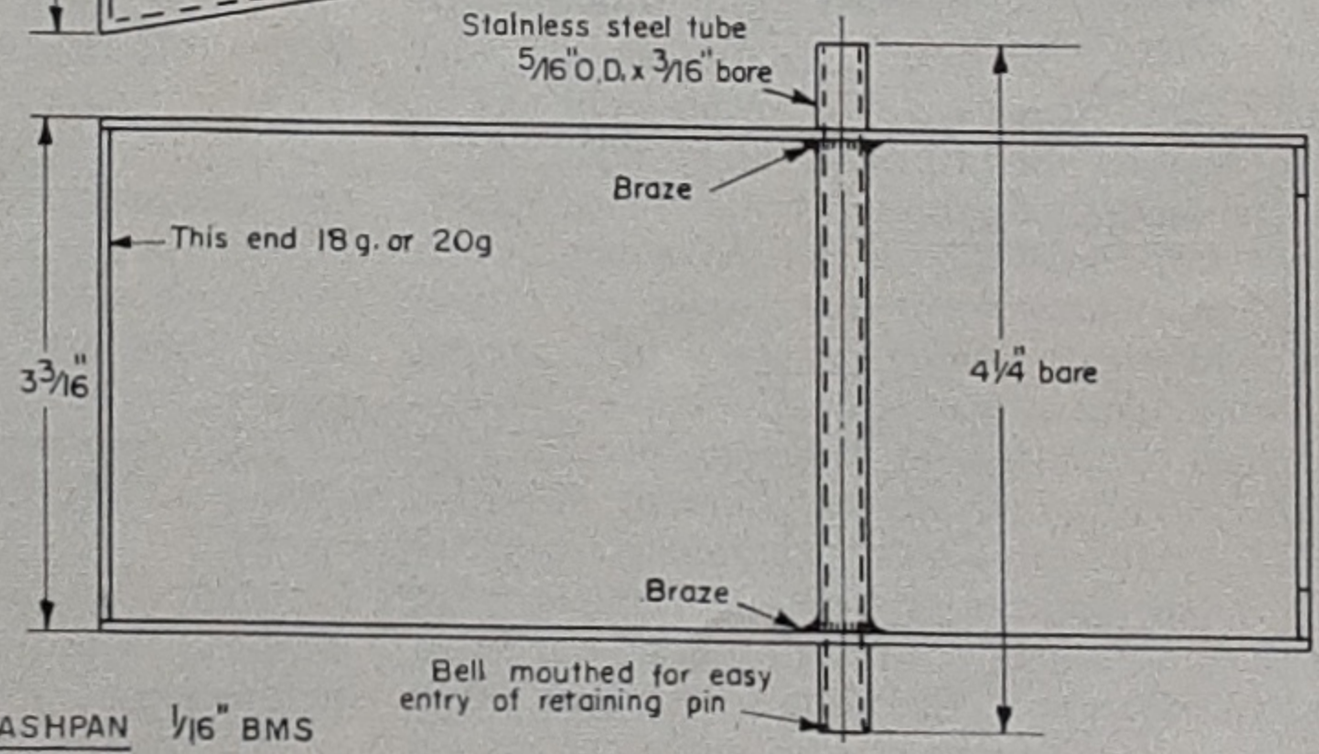
AD FITTINGS



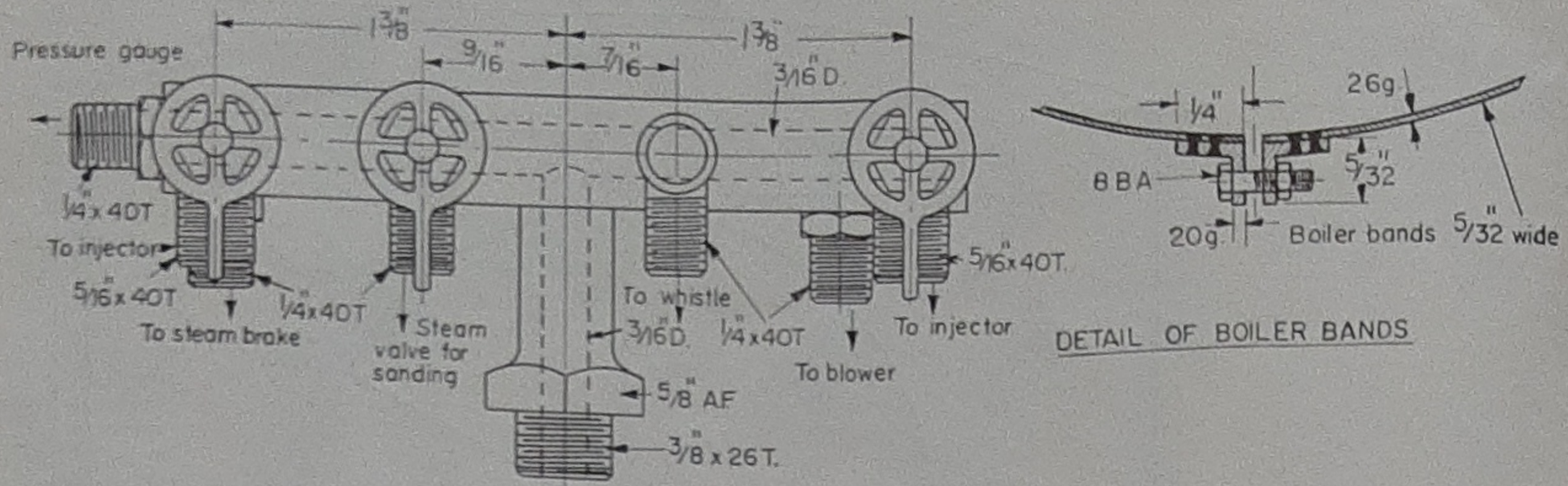




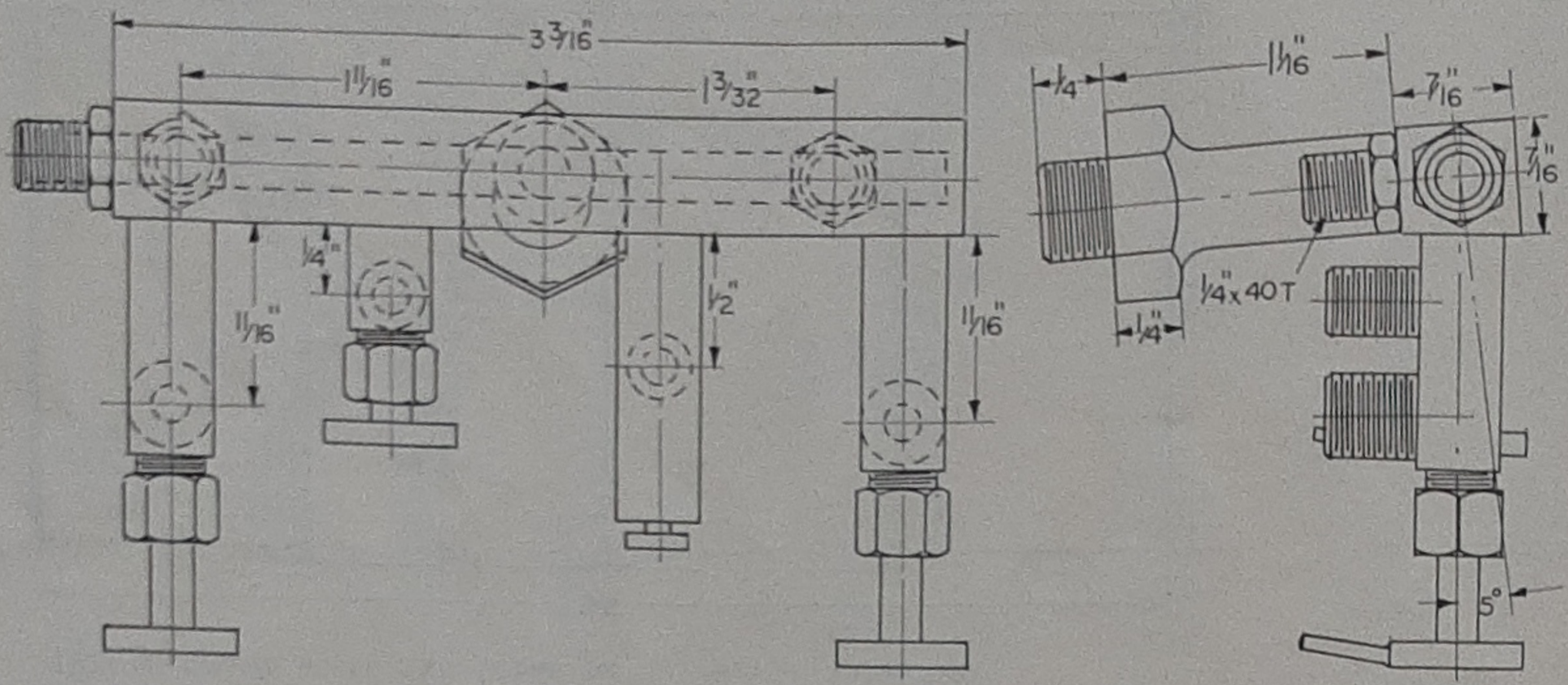
RETAINING PIN
STAINLESS STEEL



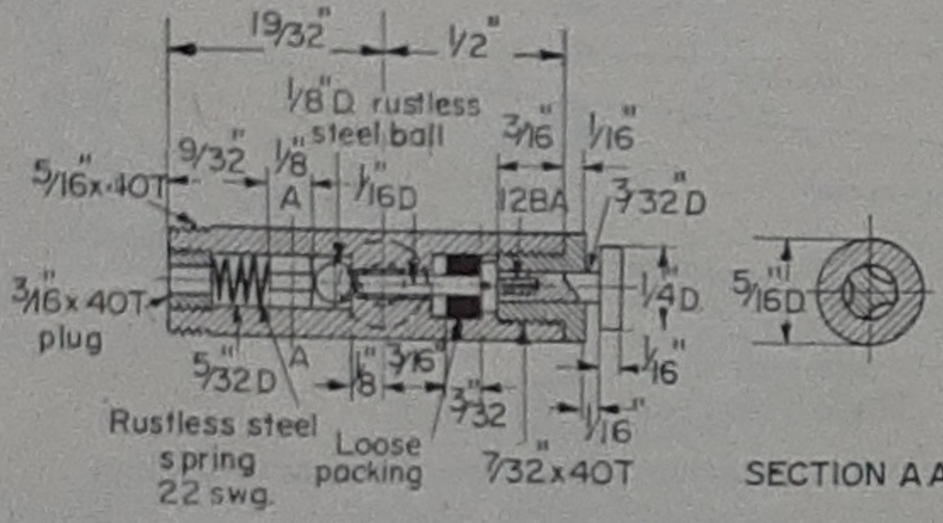
ASHPAN 1/16" BMS



DETAIL OF BOILER BANDS

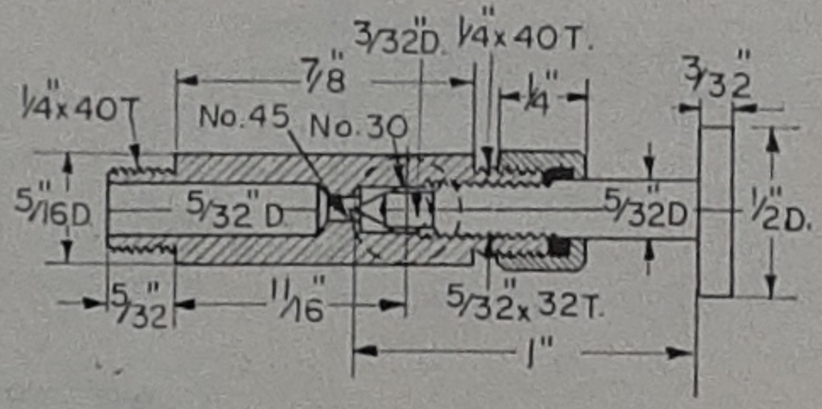


MANIFOLD G.M. RUSTLESS STEEL SPINDLES

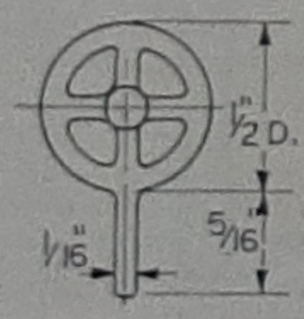


SECTION A A

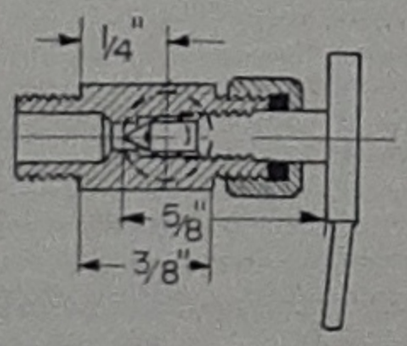
WHISTLE VALVE



VALVE FOR INJECTOR 2 OFF

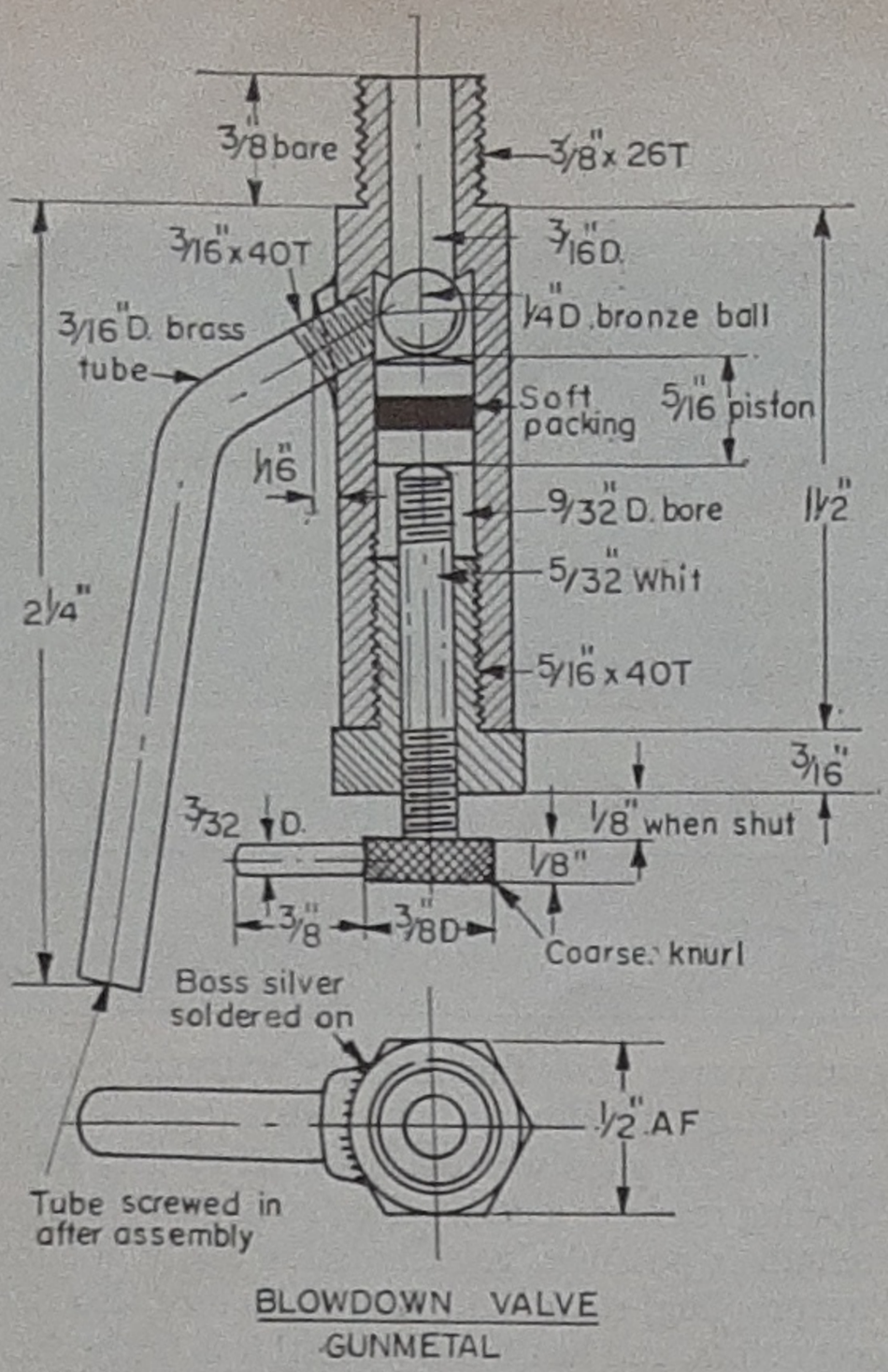


HANDWHEEL G.M.
6 OFF



Other dimensions as for valve for injector

STEAM VALVE FOR SANDING



BLOWDOWN VALVE
GUNMETAL

amount to more than $\frac{1}{8}$ in., so this could be used. However asbestos is not really a very good insulator, and some kind of felt is to be preferred. The difficulty is to find something of the right thickness.

For the cleading, 26 s.w.g. hard brass or hard nickel-silver can be used. The latter is preferable but is rather expensive. To make sure that the cleading is cut wide enough for the job, obtain some cardboard of about the same thickness, and wrap this tightly round the lagging first. It does not matter if the edges of the cleading overlap one another: this is quite in order and looks much better than two edges that don't quite meet.

The boiler bands can be made from stainless steel, nickel silver, brass or mild steel, in that order of preference. To be exact to scale they should be of 5/32 in. × about 26 s.w.g. section. The ends are stiffened by riveting on short pieces of 1/32 in. or 20 s.w.g. steel, bent at right angles and drilled No. 43 for 8 BA steel bolts as shown.

There are five boiler bands. The first two are arranged with their fixing bolts underneath the boiler, but those on either side of the dome have their fixing bolts on the top, so these should be made as neatly as possible. The fifth boiler band comes over the firebox, so this one cannot be fixed in the usual way. The solution here is to use an 8 BA brass screw which can be put into the foundation ring.

Before drilling the cleading for the handrail knobs, make sure that it is in its proper position, then mark off the positions for the knobs with a surface gauge, having first stood the locomotive on a piece of plate glass or something similar, also having made sure that the boiler was quite " square." The handrail knobs are held to the cleading by thin 6 BA nuts, to clear which, the lagging will have to be scalloped out locally. Don't forget also the little cutaway which is required in both lagging and cleading, to clear the valve gear when in the " full backward " position.

Grate and Ashpan

A casting is to be preferred for the grate. I expect our regular advertisers will be able to offer something suitable. In the absence of a casting, stainless steel should be used. Mild steel is not much use for grates as it soon becomes burnt out. The grate, when in position, should lie with its underside flush with the bottom edges of the inner firebox wrapper.

If stainless steel is used, file up the seven " firebars," drill them 5/32 in. dia. at $\frac{7}{8}$ in. from each end, then turn up twelve spacing collars about $\frac{5}{16}$ in. dia., and 5/32 in. bore. These should be made just a shade over $\frac{3}{16}$ in. long. Before bolting up (using 5/32 in. dia. stainless steel threaded at each end) it is well worth while filing the taper on each side of the firebars, in between the fixing holes; this will help the ashes to fall clear.

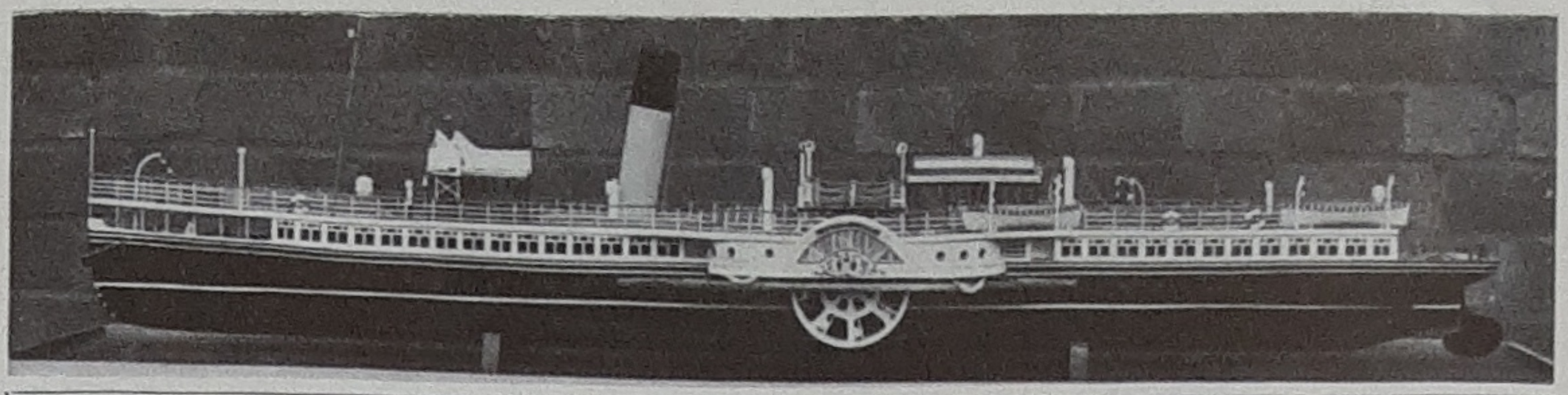
Ashpan

The greater part of the ashpan is made from $\frac{1}{16}$ in. thick mild or stainless steel. The exact dimensions required should be checked from the firebox itself. The front end is closed and thinner steel should be used for this end as there is very little clearance here for the blow-down valve. The corners of the ashpan can either be brazed up or angled and riveted as preferred.

The ashpan is held firmly up against the underside of the foundation ring by a long retaining pin, which is pushed through a length of stainless steel tube brazed to its side pieces. The exact location of this tube can be found quickly by inserting a $\frac{3}{16}$ in. dia. drill through the hole provided in the inside frames of the locomotive.

Blow-down valve

The blow-down valve may look rather elaborate at first sight. The reason why the body of the valve is so long is to allow the spindle to come well below the ashpan, otherwise its pin would foul the front end of the ashpan and there would also be burnt fingers. There was not enough room either for the usual type of stuffing box and as these blow-downs are generally operated when there is still a considerable pressure in the boiler, some form of packing is desirable to avoid burnt fingers. However the " piston," and its soft packing, should not be made too close a fit, otherwise the pressure in the boiler may not be sufficient to push the ball off its seating when the valve is operated.



A MODEL OF "DUCHESS OF FIFE"

by D. A. Ford

AFTER MODELLING "00" gauge locomotives and radio controlled aircraft, I decided it was time for a change, to make something bigger and more permanent with a bit of atmosphere about it. Not possessing any special machine tools at all, a ship model seemed to fit the bill, especially as one is fairly certain to return from the pool with the precious model still in one piece.

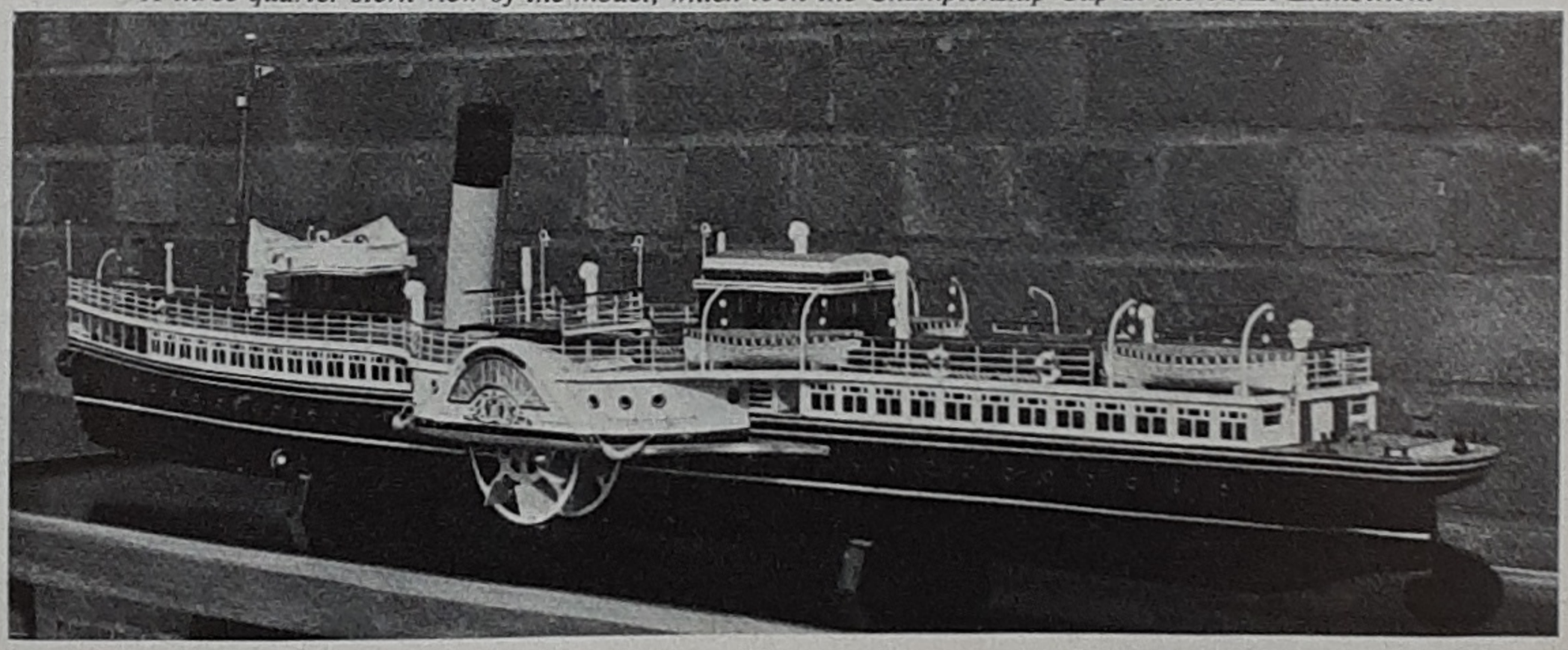
Being a lover of steam, the model had to be steam powered, and to provide a bit of atmosphere and visible movement, steam I considered essential when operating the model several feet away. So a paddle steamer was decided on, M.A.P. supplied the plans, and all was ready.

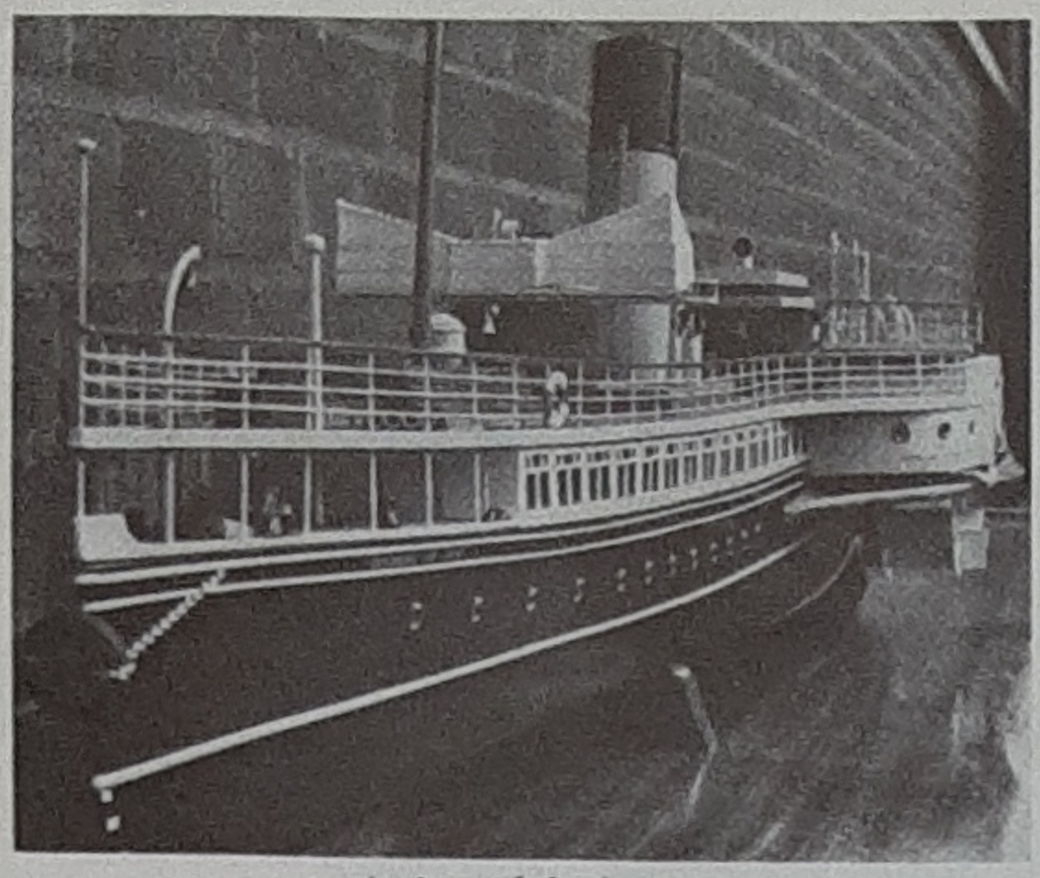
Much thought went into the next decision, from what material to construct the hull. I had heard somewhere of stability problems with model paddle steamers with their relatively shallow draught, so a thin but strong hull was required, so that as much of the all-up weight as possible could be below the waterline. I experimented with the tinplate method, but try as I would, I could not get compound curves into the tinplate without buckling and denting it. Having failed with that method, I decided fibre glass was the material to use, for the following reasons: a thin walled structure with great strength is possible, good finish is easily obtained, waterproofing, steam and heat resistance also being good points, and last but not least, it is fairly cheap.

At last construction was started with the purchase of a nice piece of fairly knot-free soft wood 6 in. × 4 in. × 55 in. for the male mould, which was carved to the exact external shape of the hull minus $\frac{1}{8}$ in. Some coarse heavyweight fibre glass matting was obtained and wrapped around the hull mould and the drawing pinned to the mould deck, and then a thick coat of resin stippled on. After curing, the high spots were filed off, and a test removal from the mould made. With the hull back on the mould, a thick coat of plastic padding, hard type, was applied and smoothed with a wet knife.

After curing, the next stage was to file and rub down with "wet and dry" using plenty of water to a dead smooth finish. With the hull removed

A three-quarter stern view of the model, which took the Championship Cup at the M.E. Exhibition.





A view of the bows.

from the mould, a ½ in. × ¼ in. spruce keel was Araldited and screwed to the inside of the hull and the same spruce again Araldited and screwed all around the top edge of the hull; with two cross braces added a very strong and light structure was achieved. The countersunk screws used for the keel etc. were filled and rubbed smooth. Brass tube was added for the rudder post, Araldited in, which completed the construction of the hull. Incidentally, the wooden mould, with a little reshaping and hollowing out, has made an excellent hull for a small radio controlled yacht; waste not, want not.

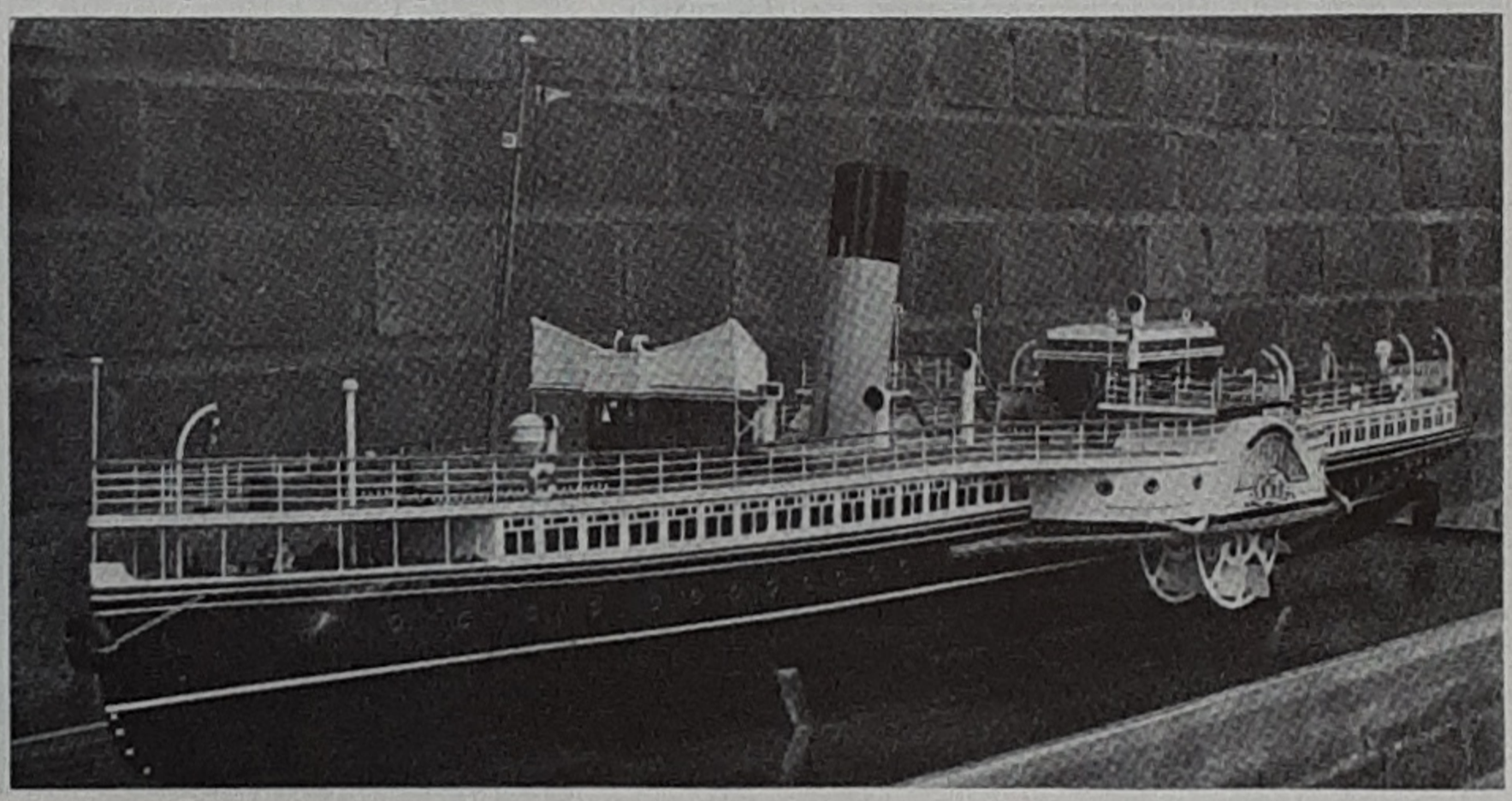
Now for the hull finish, and to digress for a moment if I may, on the subject of hull finishes.

Much has been said about the rights and wrongs of a pretty and attractive model as opposed to complete authenticity, hull plates, rust marks, etc. Taking all considerations into account, I would always aim for a pretty and attractive and clean look. A model is a model, and not the real thing; however, much work is put into, say, the making of rust marks; they always look so false, as do miniature human beings. However, that is a purely personal opinion, so back to work.

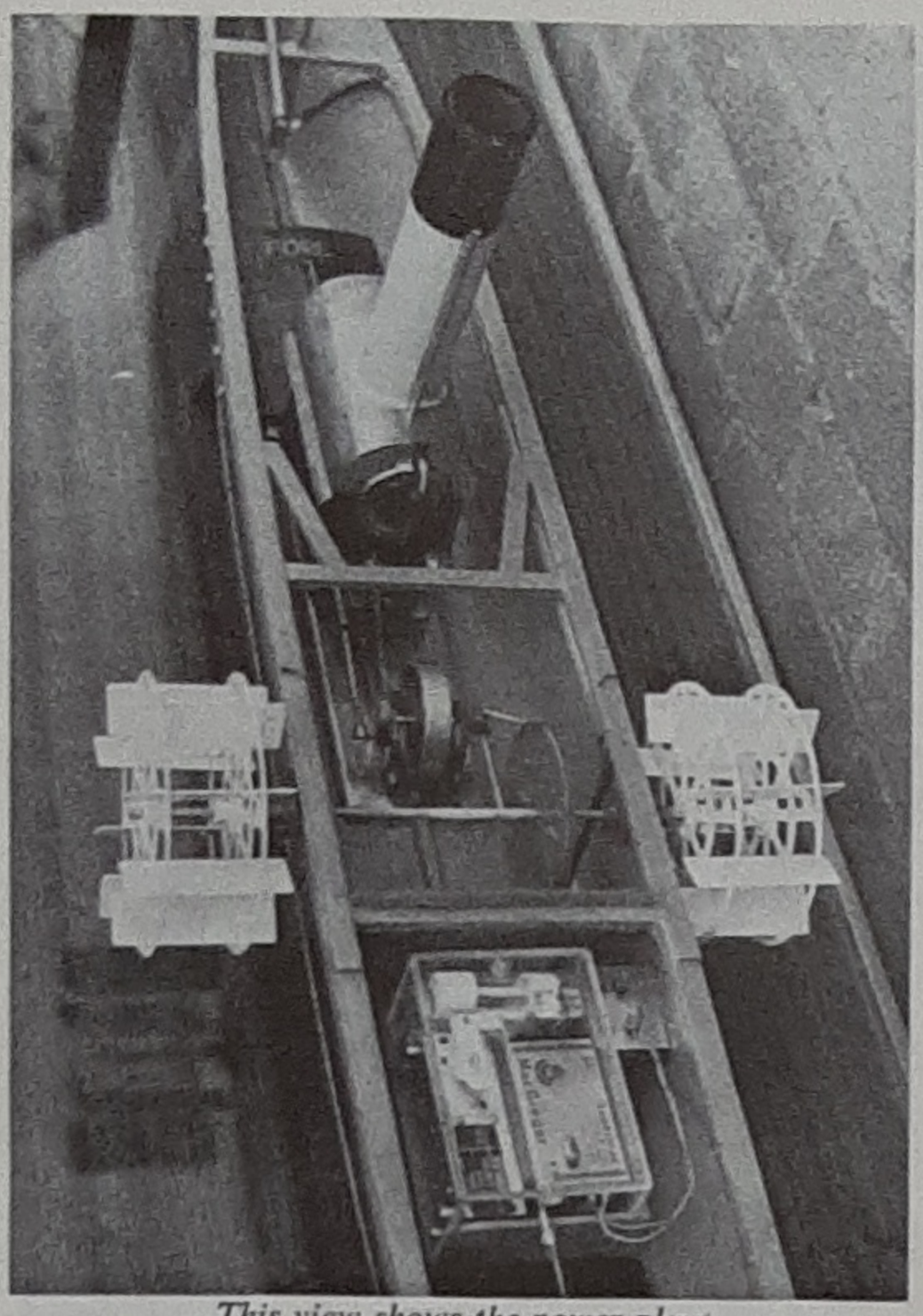
The hull was degreased and 16 coats of black cellulose applied by brush; incidentally, all in the same day. There is no need to rub down between each coat, I think it is a waste of time and paint. After allowing three weeks for the cellulose to harden, the paint was made satin smooth with " wet and dry," then followed the arm-aching job of polishing with Duraglit wadding until the finish was like glass.

I was careful not to rest the hull on any object for six weeks, as even the smoothest cloth would mark the finish. The boot-top and cheat lines were applied, using white Humbrol and cellotape strips. " Duchess of Fife " was added with Letraset at the bow and to complete the hull, port holes were turned from brass washers, mounted on a bolt and nut, and filed whilst spinning in the electric drill chuck. The port rims were polished and fixed in place with contact adhesive and finally varnished. Proper glass portholes were not attempted, they would be a source of leaks and with the deck in place they would appear gloss black the same as the hull.

During the building of the hull, a lot of thought was put into the power plant, with simplicity and cheapness foremost in my mind, and having no machine tools, I purchased a Mamod SE2A steam plant, hoping it would prove powerful enough. The steam plant was removed from its base and the cylinder unit moved to an in-line position with the boiler, and bolted to an aluminium base. Now a method had to be found to fix the engine unit in the hull rigidly, but still having the facility of very quick removal in case of fire. So two locating lugs with angle pieces were Araldited to the bottom of the hull for the front of the base to slip onto and



Another view of the model "Duchess of Fife."



This view shows the power plant.

under the rear end, being held down firmly by a spring piece of aluminium pivoted at one end, the other latching under a rivet Araldited to the base of the hull.

The next stage was to cut the paddle shaft bearing holes in the hull. This done, I Araldited used self-aligning bearings for a 5/32 in. 12 in. shaft, assembled in the bearings with a 3 in. Meccano pulley wheel. The shaft was given a dash of Araldite to hold the inner races to it. A Meccano spring belt linked up the engine unit to the shaft, the outside pulley on the engine being used so the belt could be easily slipped off in a hurry.

The reduction ratio is approximately 10:1, so with fingers crossed I ran the engine and found to my great relief there was plenty of power; in fact, I could not stop the shaft with finger pressure. However, I was very alarmed to see flames licking around the boiler. Dreading the decking going up in flames, a tinplate casing was made to wrap round the top of the boiler, giving it $\frac{1}{2}$ in. clearance to prevent the soft solder from melting. The casing overlapped the boiler stand and bent outwards to induce a little cooling air up the funnel. The funnel was made up from tinplate, soft soldered to the casing, and for a bit of efficiency the exhaust pipe was led up the funnel. Gravity plus a locating ring in the top of the funnel holds the funnel assembly to the boiler. Another steam test proved the need for a spot of lubrication as the engine slowed almost to a stop every now and then, so a simple displacement lubricator made from bits and pieces was fitted. Further runs proved quite satisfactory. Felt pads well greased were fitted on the outside of the paddle shaft bearing, backed up with Meccano bushes.

Now to the paddles. Articulated paddles were ruled out on account of machining bushes etc., so rigid paddles were made from 24 s.w.g. aluminium, fret-sawed out and riveted together, the whole assembly being mounted on Meccano bushes.

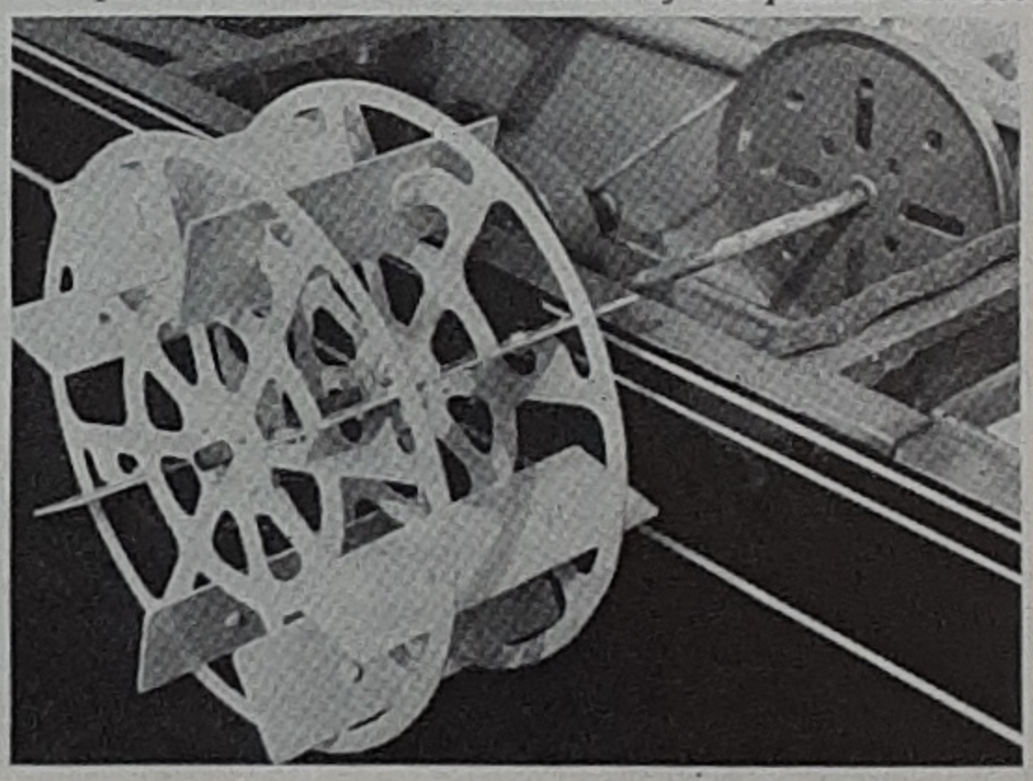
Radio gear was installed connected to a rudder made from tinplate soldered to $\frac{1}{8}$ in. brazing rod pivot. The rudder was then smoothed to a nice section with plastic padding and off to the pool.

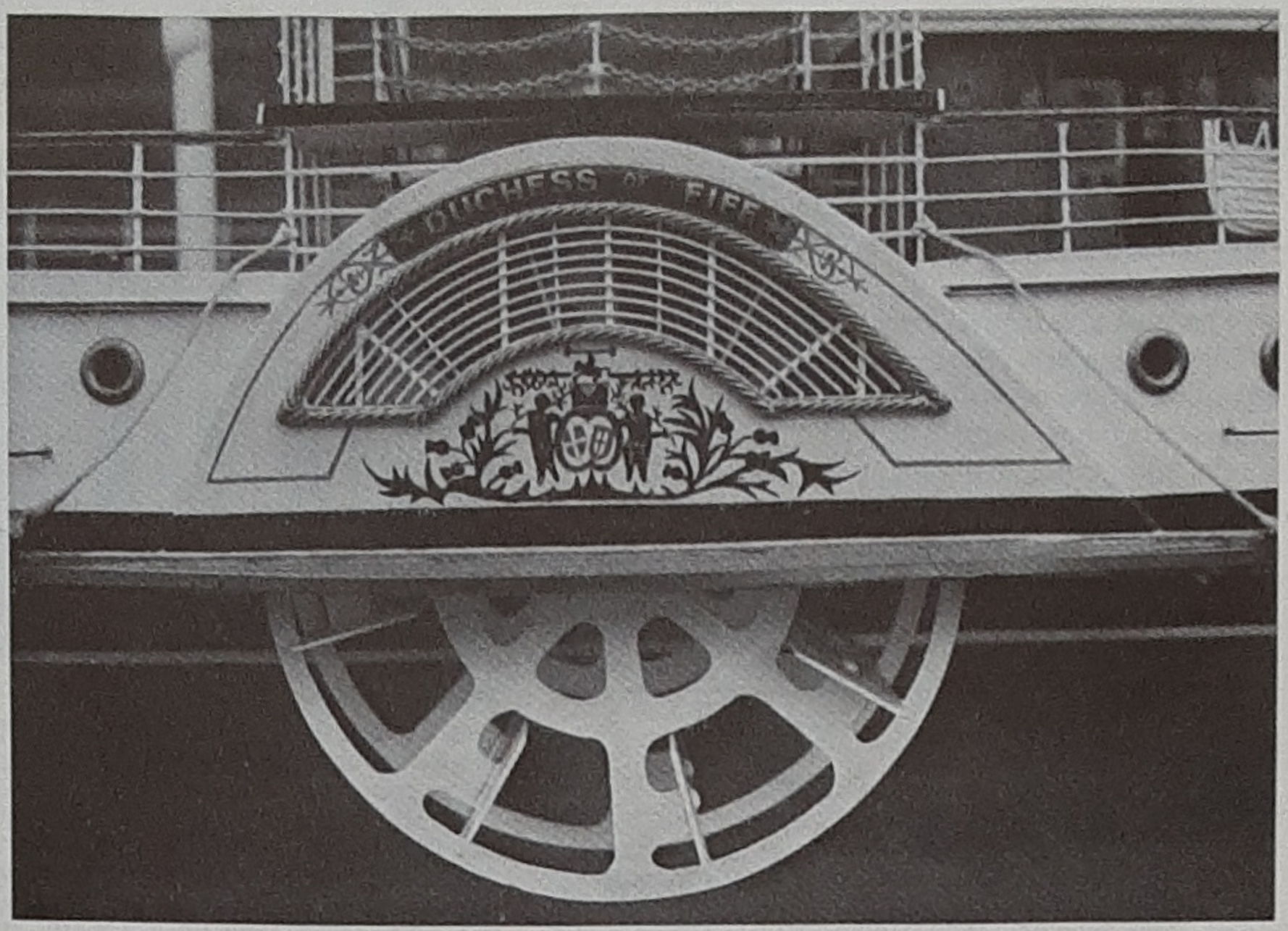
About 6 lb. of ballast in the shape of spanners were temporarily laid in the bottom, and off she went on her maiden voyage, which was cut short when the belt came undone. Cold, wet feet and a dash of Araldite later, several trips were made with complete success. The speed was about scale. I could not get the turning circle any less than 20 ft. diameter, so care was needed in control. Duration is about 12 minutes; just about right. The success of the hull and power plant gave me added confidence to make a start on the decking.

The first operation for the decking was to make up port and starboard paddle covers from 1/32 in. ply; these are held in position by two $\frac{1}{2}$ in. $\times$ $\frac{1}{4}$ in. spruce struts placed laterally across the hull and glued to the covers at deck height. These gave me a deck datum to work to, so two pieces of 1/32 in. ply running longitudinally, about 1 in. either side of the hull centre line, were glued to the cross members, making a sort of chassis for the deck; so the whole deck, complete with paddle covers, could be removed as one unit from bow to stern for easy access.

The side cabin windows were cut from 1/32 in.

This picture shows the construction of the paddle wheels.





A close-up of the paddle box.

ply and backed with thin perspex, but the windows nearest the engine unit were left without perspex to allow cooling air to the engine unit. The side window strips were glued in place to the deck chassis with 1/32 in. ply spacers forming strong box sections. The actual deck was made from 1/32 in. ply, the planking simulated by scoring the ply with the back of the modelling knife down to the first lamination. When varnished, it looks quite realistic. The paddle cover sides I made up separately from 24 g. aluminium—with these separate from the covers I could get some fine painting done.

The grating in the paddle cover sides was done by Aralditing vertical tinplate strips to the back and thin piano wire soldered to these to form a curved grid. The nameplate is 24 g. aluminium thickened with plastic padding, Letraset providing the letters. To get the rope-shaped beading around the grating, I twisted several strands of 26 s.w.g. copper wire to form the rope shape, I then ran solder through it to lock it together, then the beading was filed to half round shape, shaped and cut and then Araldited around the grating. Painted gold and varnished, it adds a touch of quality. The coat of arms was hand painted, then varnished, and the whole assembly Araldited to the paddle cover sides.

The railings, a job I really enjoyed, were made completely from piano wire, erected and soldered on the job; the wooden handrail is of balsa grooved underneath and Araldited to the top rail, then sanded, stained and varnished.

The lifeboats are clinker built, again 1/32 in. ply. The planks were assembled to a keel with one centre former, a tricky job but well worth it. The tops were covered with canvas. The grab ropes were made with soft aluminium wire and were shaped to get uniformity on a jig, consisting of alternate $\frac{1}{4}$ in. dowels and pins tapped into a baseboard. The grab ropes are held in place with contact adhesive.

The next job I was dreading, as I had to cut 640 1/32 in. × 1/32 in. ply strips, each one to be glued separately to the sparred seat frames; they were finished by varnishing and fitted with the grab ropes already described.

Perforated zinc was added around the funnel and for the deck grating, not the best thing to use, but I could not think of anything better at the time.

The wheelhouse and first class entrance were built up from 1/32 in. ply, the bridge windsheeting was made from the best part of an old handkerchief and sewn on. This windsheeting, together with the black topped funnel, represent the *Duchess of Fife*, as far as I can tell, during the 1923 period. After that date a covered bridge was added.

The mast is quite interesting, a piece of $\frac{1}{4}$ in. dowel was split in half lengthways, a groove made at the centre, the two halves then glued back together, trapping a length of piano wire inside. The mast was then tapered, a miniature plug Araldited to the base and hey presto, a well disguised radio aerial. The mast is placed through a hole in the deck and into an aluminium tube with a miniature socket fixed at the bottom to prevent

interference from the engine unit. The socket is connected to the rear radio bay with coaxial cable, the outer casing of which is led to earth through a brass strip stuck to the bottom of the hull.

Neat ballast weights were built up with strips of lead and piano wire, and handles fixed to them. The ballast weights are held in position by their shape to the keel and hull.

That just about covers the building of the *Duchess of Fife*. For a first effort, it has been a good exercise in building a successful model as cheaply as possible. The outlay has been £10. At the pool side the model soon collects a small crowd which seems to indicate an appreciation of a model that steams along slowly for a change.

I conclude by hoping that anyone who attempts this particular project finds the same satisfaction and happy hours it has given me.

JEYNES' CORNER

Has the past a future?

THE RYHOPE PUMPING STATION of the Sunderland and South Shields Water Company contains a magnificent pair of beam engines, built by Hawthorns of Newcastle-upon-Tyne in 1868, which have given almost a century of service. They were laid aside after 99 years of continuous pumping duty. Their retirement was not due to any defects in either engines or pumps; but to infiltration of saline water, which mingled with the water being pumped for distribution through the mains.

This pair of engines are undoubtedly among the finest beam engines remaining in this country, and were erected under the supervision of Thomas Hawksley C.E., who was responsible for several other important water works in this country.

Now they are redundant; but it is hoped that this pumping station can be preserved in its entirety, to form the nucleus of a museum of pumping machinery at some later date, as an example of Victorian engineering at its finest. Look at the massive twin beams, 33 ft. between the pump gudgeon pin centres, and at the flywheels which are 24 ft. in diameter, and weigh nearly 20 tons, and then realise that they were put in place without the help of massive mobile cranes! These great components were hoisted into position by brawn, suitably directed by brain, solely by the aid of king posts, rope-blocks, " Blondins " and packing, inspiring a respect for those erectors of so long ago.

The entrance to the pumping station is up a flight of stone steps, the crankshafts being well below this level, in a sort of basement. On entering, the governors immediately catch the eye, standing as tall as an average man, all nicely polished, as are all the bright steel parts, now covered in a protective coat of grease. The engines are compound on Woolf's principle, and a pump rod works from each end of the beam.

Oliver Smith visited these engines some years ago, and the outcome of his visit was an excellent article in *Model Engineer* for January 1, 1965, accompanied by 12 photographs and three photo-copies of drawings. He was lucky, as the engines were still at work at the time of his visit, warm and alive; but when I visited them last July, they were cold and dead. I experienced the same feeling on entering the engine room which is commonly felt on entering some consecrated building; there is the same sort of silence, and one is inclined to lower the voice in conversation, as a mark of respect for the surroundings.

It is to be hoped that among others, model engineers all over the world will subscribe to the efforts which are at present being made to save this splendid monument of Victorian Engineering for preservation.

To those who look up Oliver Smith's article of January 1, 1965, I would point out that in the paragraph relating to the bores and strokes of the engines, the figures for the bore of the low pressure cylinder have been transposed; the bore is 54 in., not 45 as printed. He also gives the consumption of coal as 1¼ cwt. per hour, I think this must be another misprint, as Hawthorn's records state these engines were 190 n.h.p. at six revolutions per minute.

Should it become possible to save these engines, it is hoped to be able to put one in steam on occasion, and to equip the other engine so that it can be rotated at its working speed by an electric motor. Apart from the engines, the building in which they are contained is a first-class example of Victorian building associated with engineering.

McEWAN PRATT LOCOMOTIVES

continued from page 531

few years later was the problem finally solved.) The largest locomotive fitted with " Duplex " transmission was No. 800 of 1920, a standard-gauge 100 h.p. 0-4-0, which is now preserved in the Museum of Staffordshire Life at Shugborough Park.

After representing the best in petrol locomotives for some twenty years, the name of McEwan Pratt was abolished in 1925, five years before the appearance of practical light diesel engines spelt the end of the petrol locomotive itself. What might have happened had the original firm weathered the crisis of 1911/12 and World War 1 not taken place, one can only conjecture. Perhaps one of the less conventional model builders will show us one day. ▣

THE WOBBLER

by Ian Bradley

SETTING WORK to run true in the lathe is an all-important operation if satisfactory primary requirements of machining accuracy are to be achieved. The self-centring chuck automatically ensures a reasonable standard of accuracy for any hexagon or round bar material mounted in it, so it will suffice for much of the work the machinist is called upon to perform. The accuracy of the average self-centring chuck, however, is limited and by its very construction is not necessarily constant for all diameters of work; in addition, it does not, or should not, accept irregular-shaped work.

The 4-jaw independent chuck, on the other hand, does accommodate irregular shaped jobs in addition, of course, to accepting bar material other than round or hexagon stock. The chuck can be set to very close limits of accuracy making use of the dial test indicator, an instrument with which the majority of readers will be familiar.

Workers find no difficulty, with the aid of the dial indicator, in adjusting an independent 4-jaw chuck to mount a piece of round work accurately; but they are sometimes at a loss when dealing with a component such as a casting or piece of plate material for example, that has only a centre marked out on it and needs to be bored out accurately from this single reference point.

It is in these circumstances that the device illustrated in Fig. 1 can be brought into use. This is the centre finder or " Wobbler " as it is generally known; it consists of but three parts, the body, the

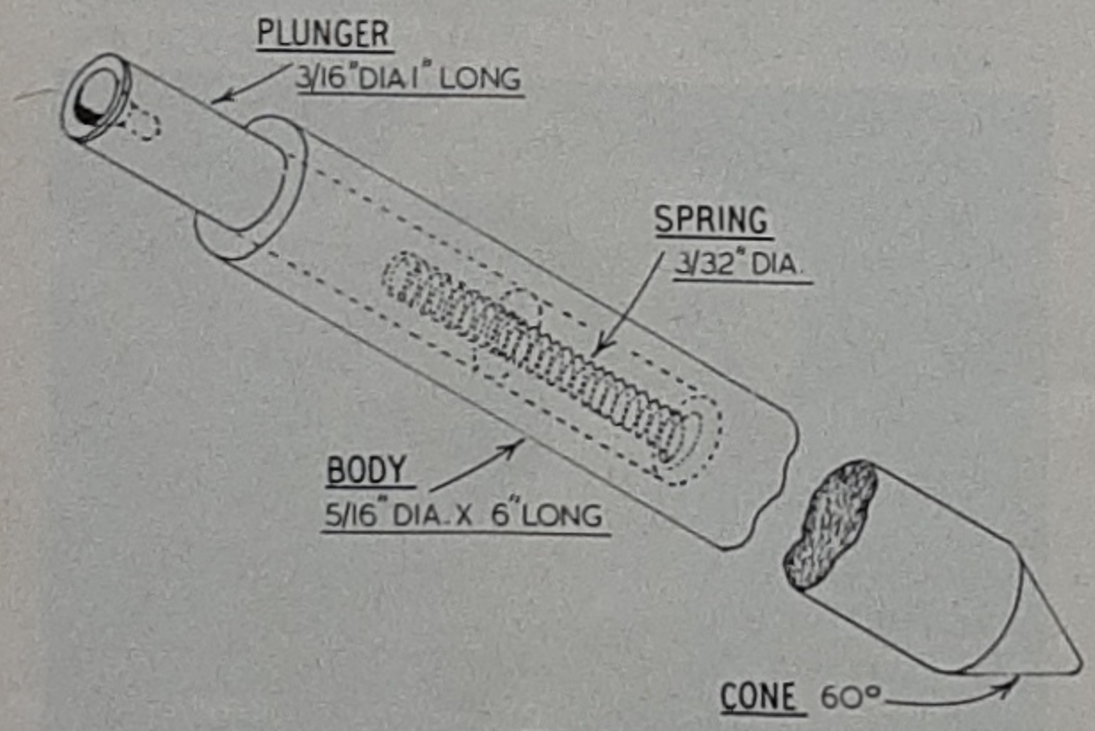


Fig. 1.

plunger and a compression spring set in the plunger and abutting the base of the hole in which the plunger moves. The body possesses a coned nose of 60 deg. included angle, whilst the plunger has a coned recess formed by a Slocombe centre drill.

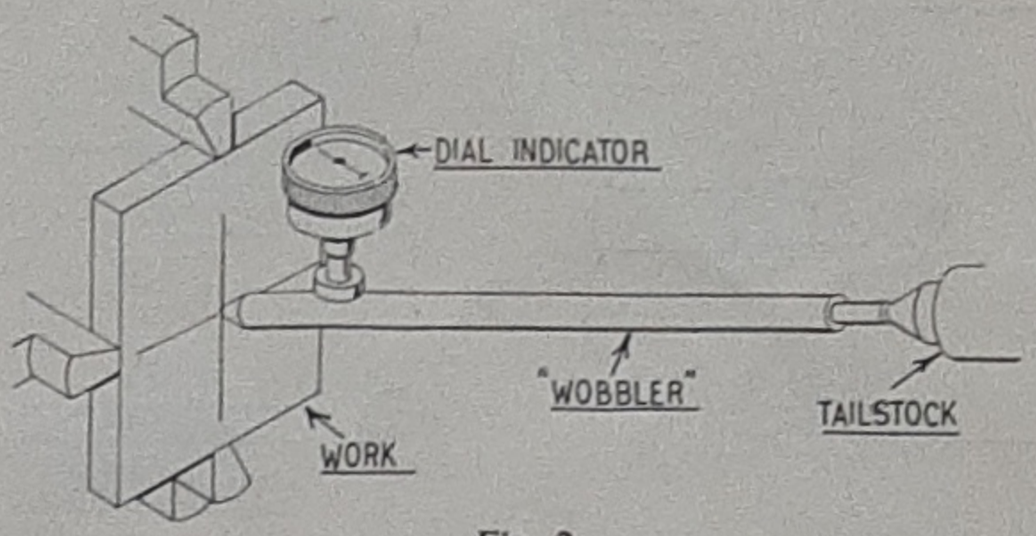


Fig. 2.

As seen in Fig. 2, the Wobbler is used in conjunction with a dial indicator, having first been brought into contact with the work. To this end, the plunger is rested against a centre set in the tailstock whilst the 60 deg. cone point of the device is placed in the centre of the work that has been marked with a punch. The punch used should also have a 60 deg. coned point and the mark made by it deep enough to support the point of the Wobbler itself. Some workers might prefer to enlarge this centre with an appropriate centre drill, but this is not strictly necessary if the punch mark is made deep enough.

The dial indicator is applied in the manner shown, with an " elephant's foot " attached to its plunger; the indicator will then register any inaccuracy of work setting when the chuck is rotated by hand. It is then a simple matter to adjust the chuck jaws until no movement of the indicator takes place.

Making a " Wobbler "

The work involved in making the device is simple enough. The body, which can conveniently be made from a length of silver steel, needs only to be drilled axially to receive the plunger. If it is possible to ream the $\frac{3}{16}$ in. dia. hole at the same setting, so much the better, for this treatment will impart a smoothness to the surface that will materially improve the quality of the finished product. Sufficient accuracy of mounting will be achieved if the length of silver steel is held in the self-centring chuck both for this operation and that of machining the 60 deg. cone on the opposite end of the body. On the other hand, the use of the 4-jaw independent chuck for all operations is both good practice and a guarantee of excellence provided the work is set to run true in the first place.

Assuming that an independent chuck is to be employed, the sequence of operations for making the body is as shown in Fig. 3. First of all, the length of silver steel is set to run truly in the chuck by means of a dial indicator (1). Next a centre drill is mounted in the tailstock drill chuck (2), and is used to provide a centre for the pilot drill (3).

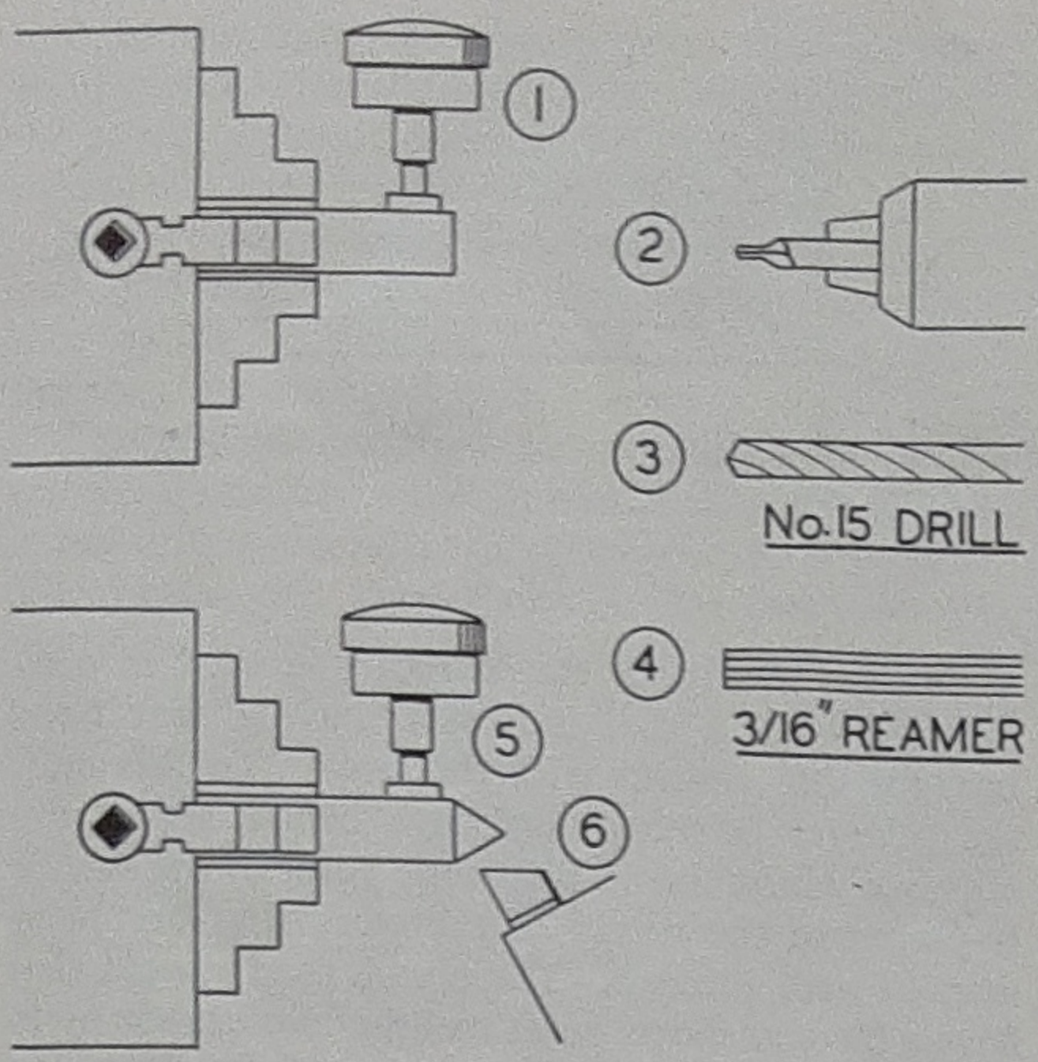
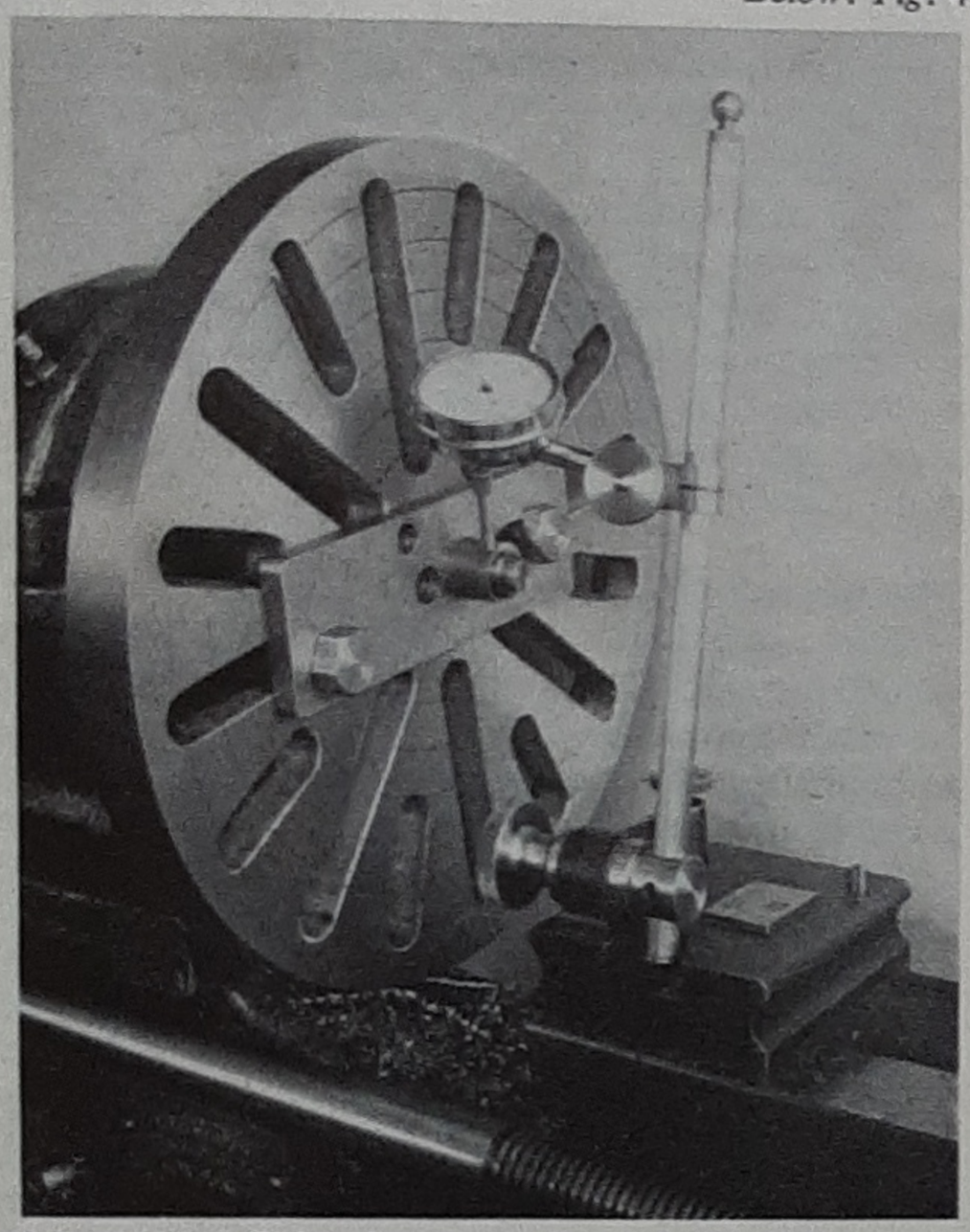


Fig. 3

Below: Fig. 4



After this drill has been run in to the correct depth, a $\frac{3}{16}$ in. dia. reamer is mounted in the chuck so that the piloted hole can be machined to size (4).

When the work on this end of the body is complete, the part is reversed in the chuck, set to run true with the indicator (5) then machined to provide a 60 deg. cone on its outer end with the lathe top-slide set over 30 deg.

The plunger, made from a 1 in. length of silver steel, needs much the same treatment as the body. A short length of the material, sawn by hand from the parent bar, is first set in the chuck so that it can be faced at each end before being centre drilled to accommodate the lathe centre and also drilled to receive the small compression spring seen in the first illustration. This spring is of a type once, and perhaps still, used in petrol lighters. To ensure that the plunger does not fall out of the body when the device is not actually in use, each end of the spring needs to be unwound, so that it fits firmly both in the body and the plunger itself. It will be quite easy to push the spring into place and so keep the device together.

Mounting the Dial Indicator

As the dial indicator has to be used in conjunction with a wobbler, it may not be out of place here to discuss some of the methods that can be employed to mount the indicator, as well as to suggest one simple device that will enable the instrument to be quickly brought into play.

The usual method is to attach the indicator to the stem of a surface gauge as shown in Fig. 4. Here the instrument is being used to adjust work attached to the faceplate. The base of the surface gauge is not clamped in any way, so care has to be taken not to knock the gauge or the reading on the dial indicator will be put out.

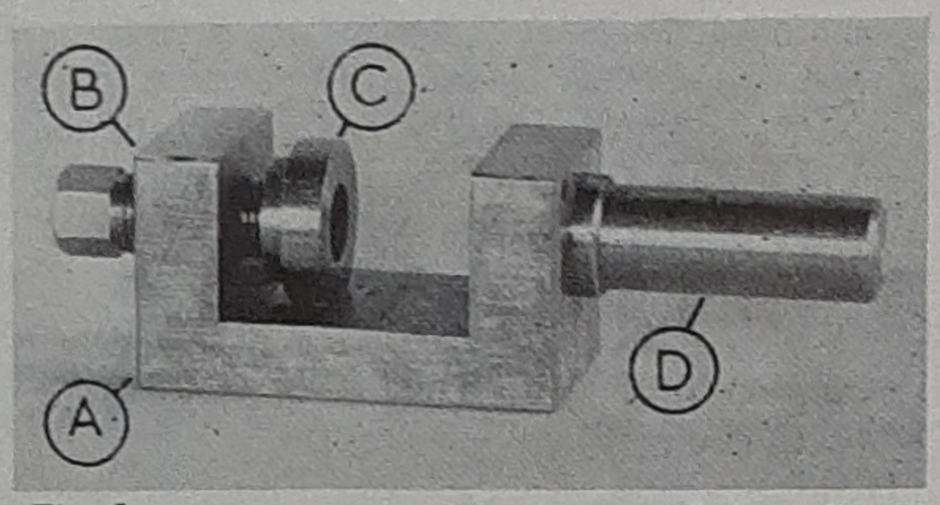
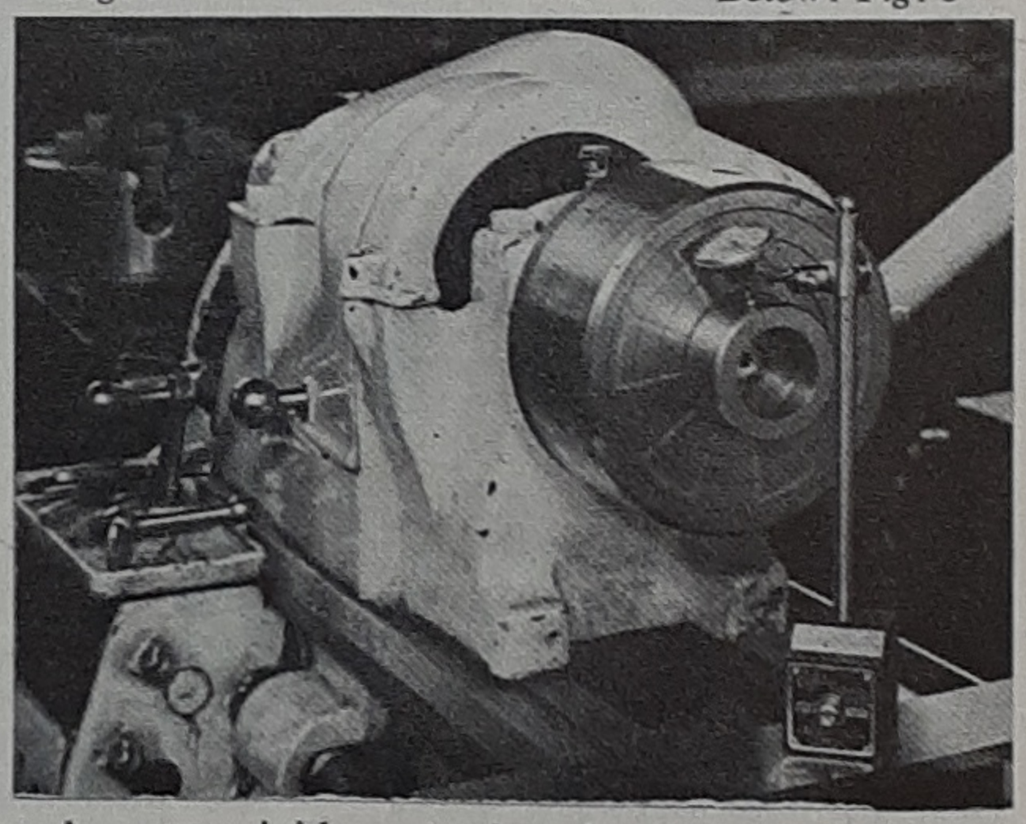


Fig. 5

Below: Fig. 6



A more rigid mounting is that illustrated in Fig. 5. This is the "Eclipse" Magnetic Base. This device consists of a base member containing a

powerful magnetic system that may be brought into operation or shut off by means of a plunger passing through the base itself. A column is fitted to the base member, and on this are employed the commonly used clamps for the dial indicator. The magnetic base is a very versatile device; not only can it be applied to flat surfaces, preferably those that have been machined, but it may also be attached to shafts or machine spindles when checks need to be made.

Perhaps one of the more useful methods of mounting a dial indicator is one that will allow it to be attached directly to a lathe tool set in place on the top-slide. An indicator so mounted is illustrated in Fig. 6. The great advantage of the arrangement, especially when used in conjunction with the smaller types of indicator, is that it takes up very little room and is easy and quickly set up when required.

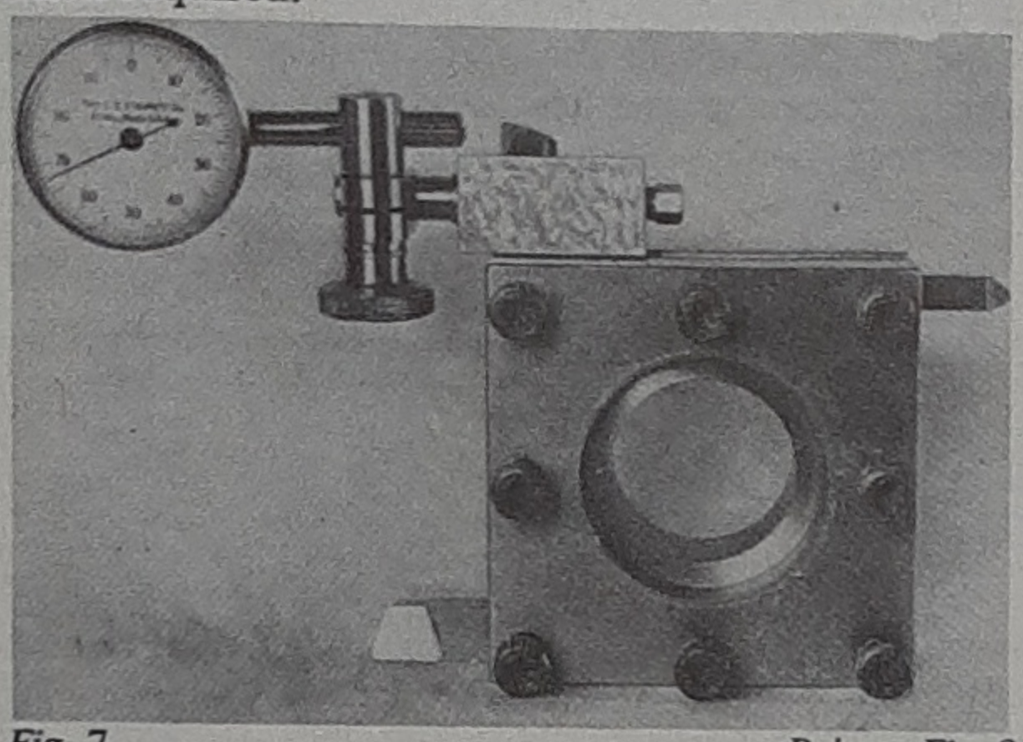
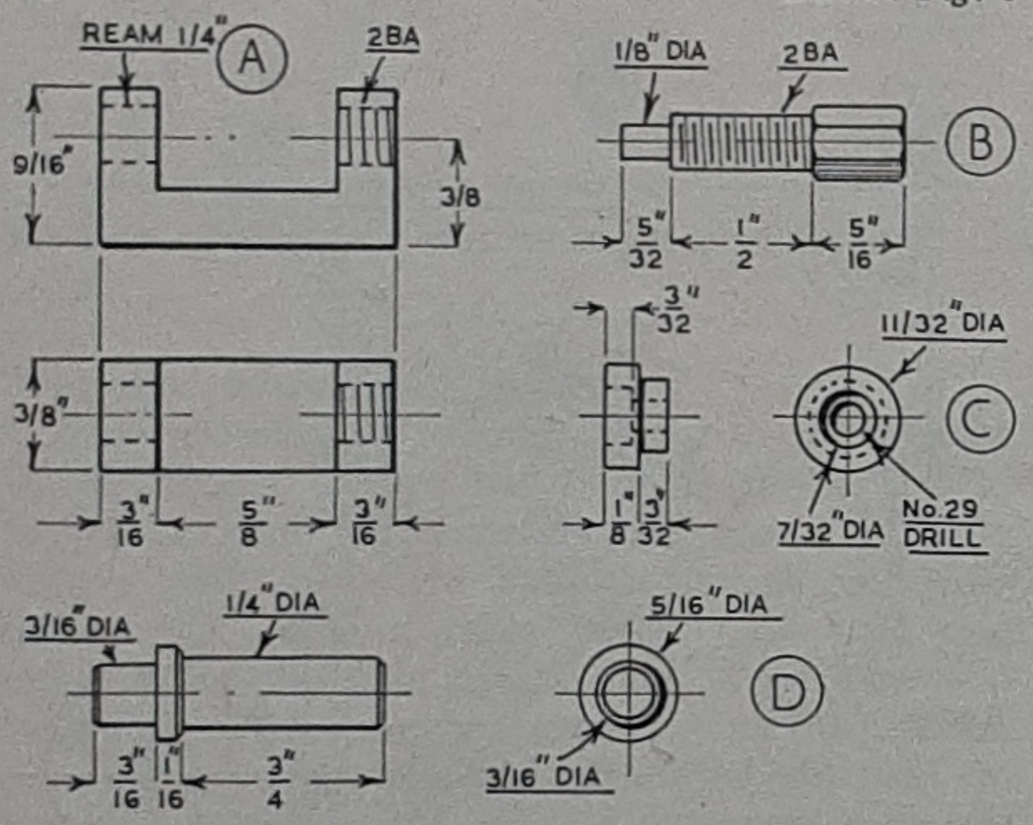


Fig. 7

Below: Fig. 8



The mounting itself is illustrated in Fig. 7 whilst the detail measurements are given in Fig. 8. As will be seen, the fitment is basically what is known as a G-clamp, provided additionally with a peg to which the dial indicator can be attached by means of the clamping device usually provided with the indicator or with the majority of surface gauges.

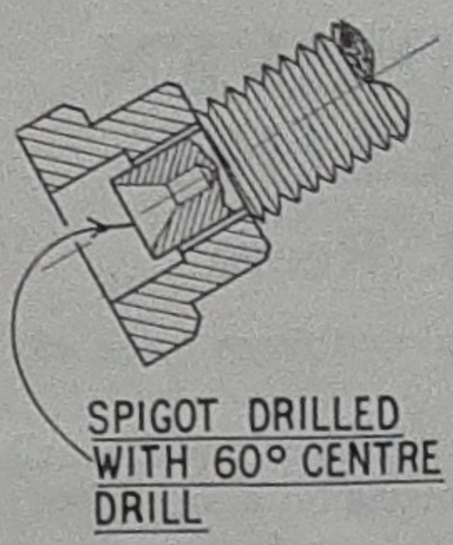
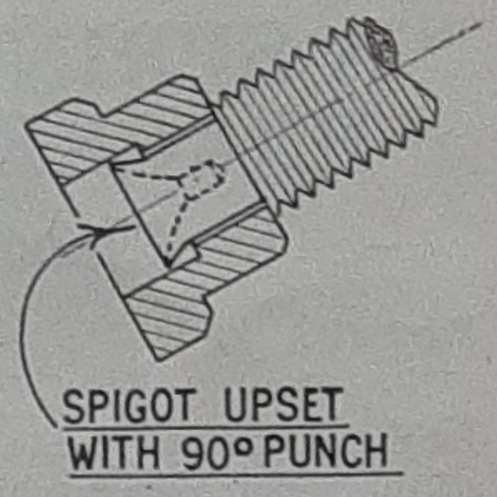
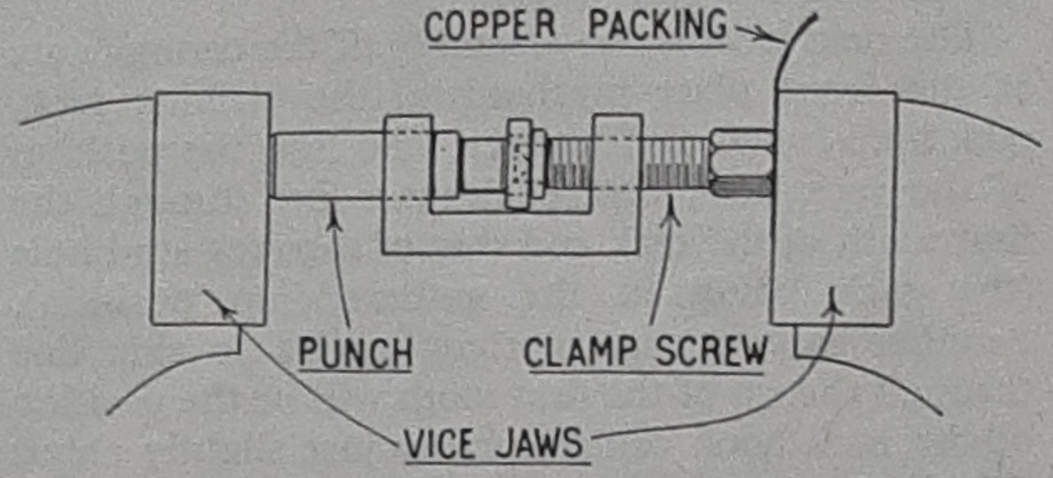


Fig. 9



Below: Fig. 10



Little need be said about the making of the mounting, for the work is quite straightforward. A word about the clamp screw and its foot, however, may not be out of place. The object of the device is to provide a self-accommodating abutment that will permit the clamp to grip firmly. Accordingly, the clamp screw is supplied with a loosely mounted "elephant's foot" secured by a simple riveting operation carried out after the screw has been threaded through the body. The elephant's foot is passed over a short spigot machined on the end of the clamp screw and the end of the spigot itself is then upset so that the foot cannot fall off. The arrangement is shown in Fig. 9.

The upsetting is carried out with a 90 deg. centre punch or a short length of mild steel rod turned at one end to a 90 deg. cone. If this simple tool is passed through the hole that will eventually receive the peg and the whole assembly is caught in the bench vice, the upsetting can be brought about by a pressing operation. Take care to protect the work, however, or it may be spoilt; a piece of brass or copper sheet will effectively mask the rough gripping faces of the vice jaws. Remember that the clamp screw itself is a somewhat delicate part, so no undue pressure should be used. The set up is depicted in Fig. 10.

For those whose work lies mainly in the field of light engineering, it may be worthwhile to arrange for the roughened surface of the vice jaws to be removed. Unless one is involved in heavy operations a smooth face to the jaws will do as well and is certainly an advantage when handling finished work. Modifying the jaws will need the use of a surface grinder and the co-operation of a firm who can get this work done. ▣

A SPRING DRIVEN BRACKET CLOCK

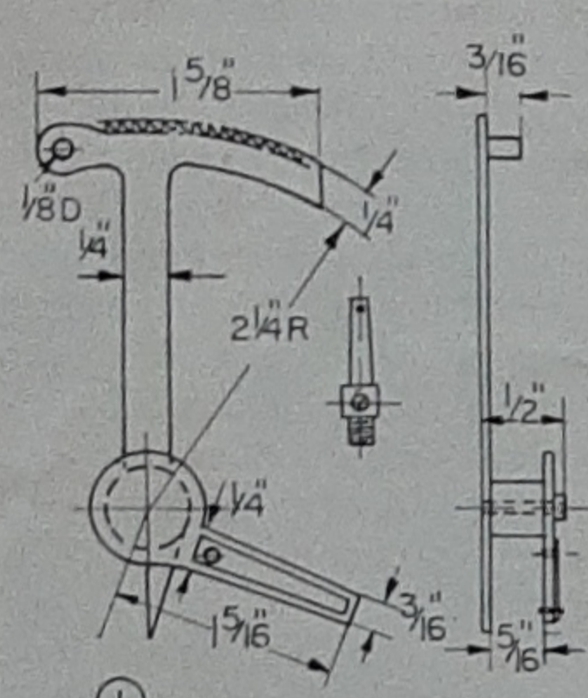
by Claude B. Reeve

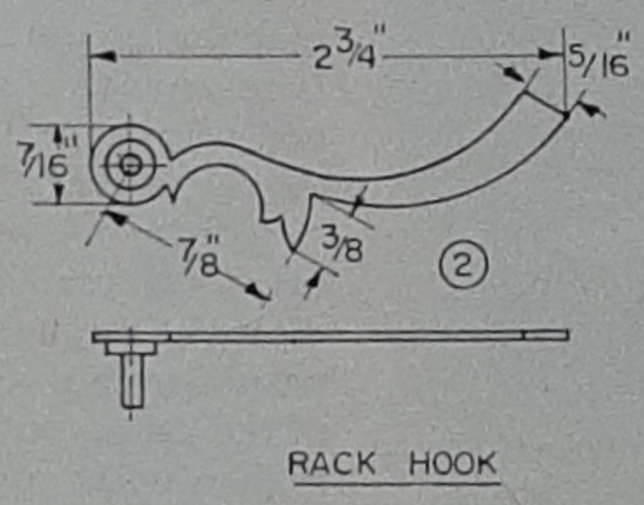
Part IV *Continued from page 487*

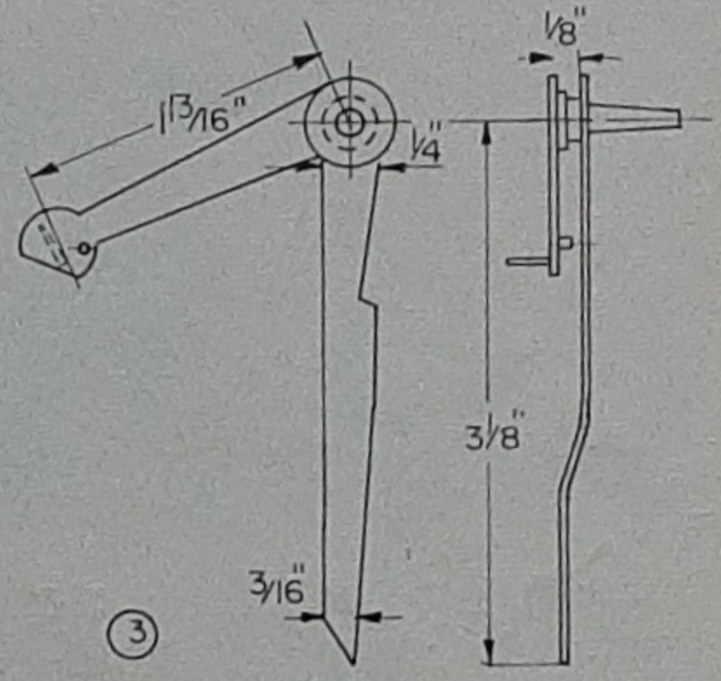
IN Fig. 10, parts No. 11 are the star wheel and the snail of the striking part which rotates on a steel stud; the snail is better fitted to a tube, a friction fit on the tube of the star wheel.

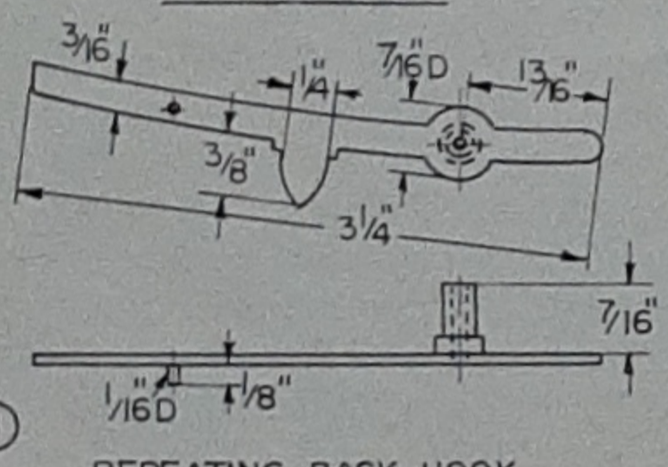
The next item is the assembly of the components of the front plate mechanism, the striking rack, rack hook, snail and jumper. To find the position of the rack hook centre, draw a line through the first tooth of the rack and that of the rack stud hole (the rack being in the gathered up position). Another line drawn at right angles to this line through the tip of the first tooth will be the position of the rack hook centre, or say just slightly above this line.

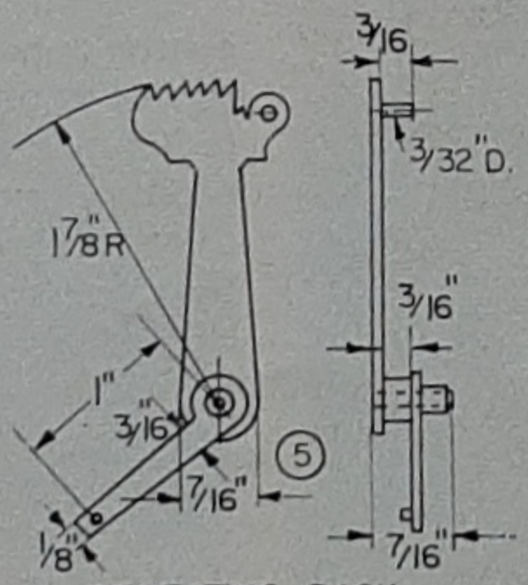
To get the distance between the rack teeth and the gathering pallet proceed as follows: Before fitting the rack to its hub, fit a piece of silver steel rod with a sharpened conical point in the rack centre, and with the rack hook mounted and the gathering pallet on the end of the pallet wheel pivot, make the gathering pallet gather the teeth of the rack. It must gather about 1½ teeth of the rack at a rotation; it must not just gather one tooth of the rack, for if this happens, the striking would not stop at the correct moment but would go on striking until the train had run down. When correct, the rack hook will sound " click, click " as it gathers a little more than one tooth and lets the rack recoil a little. When satisfied that the rack centre is correct, tap the plate with a hammer and a miniature centre punch. The plate can then be drilled and threaded to take the rack stud; if care is taken this method works perfectly. Now fit the stud of the rack to the plate, enlarge the hole of the rack centre and test again for accuracy with the rack hook and gathering pallet, after which

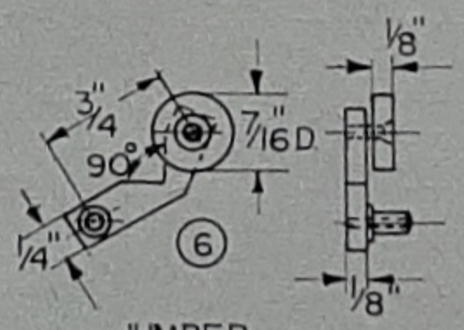


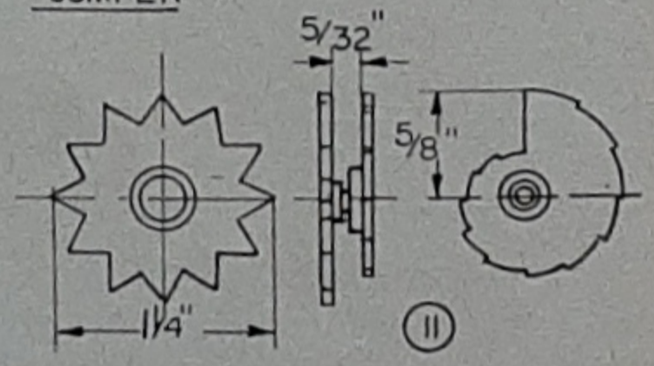


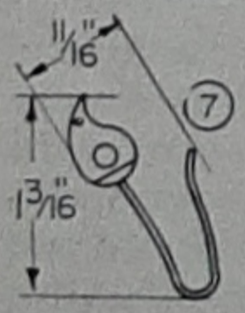


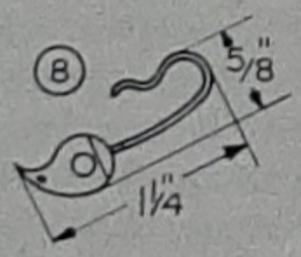












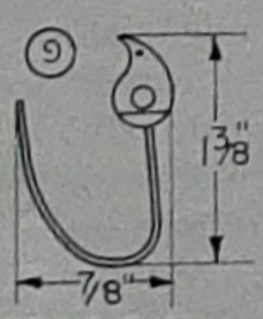


FIG. 10

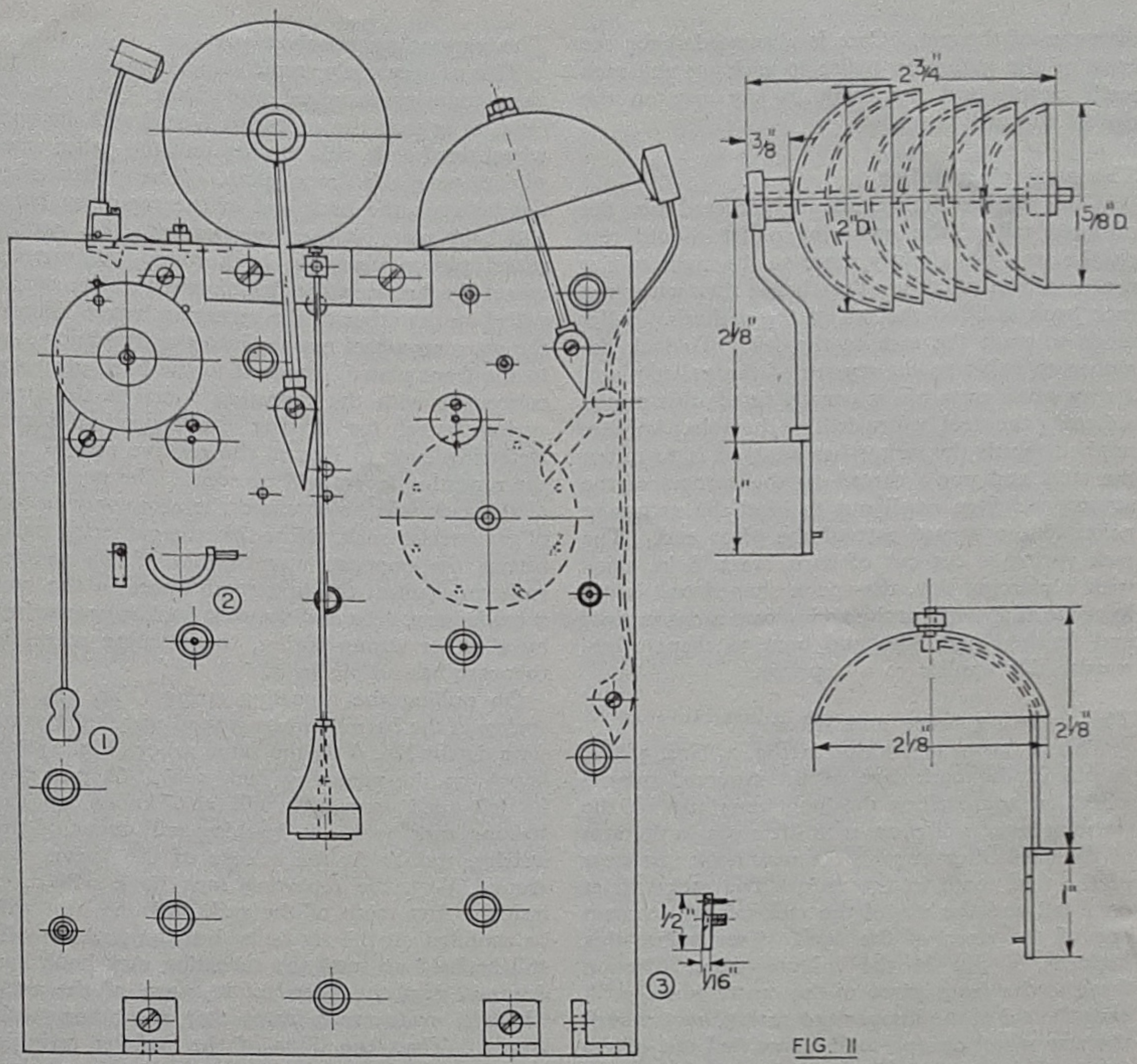


FIG. II

the hub of the rack can be made and fitted to its centre.

The star wheel and snail

This operates as follows: a pin in the minute wheel, shortly before the hour is to be struck, moves the star wheel nearly one tooth, but the jumper will complete the movement suddenly before the warning takes place. By trial and error, as in the case of the rack, a position will be found for the star wheel centre. Find the position of the star wheel first and a pointed pin held on the minute wheel will indicate the position to put the pin for moving the star wheel. The length of the rack tail is made so that its contacting pin to the snail reaches to the centre of the star wheel hub. The circular blank for the snail is roughly 1¼ in. dia.; it is marked off into 12 equal segments and the steps of the snail are marked off as follows: A silver steel pointed pin is made and hardened to fit the hole in the rack tail; now put the rack hook in the first tooth space of the rack so that the point of the pin in the rack tail is just inside the diameter of the blank snail, rotate the star wheel the distance of one segment, press the pin on the snail and scribe an arc, move the star wheel to the next segment, place the rack hook in the second tooth of the rack and repeat as before. Do this until all 12 segments have been marked out. Now detach the prepared snail and cut out with a piercing saw, leaving a little for fine finishing. Although a simple operation, the greatest care must be exercised here, for if one segment is cut too deep it will throw all the others out. To test the rack tail it should have its permanent pin fitted to the spring on the front; the rack tail will now need re-adjusting with the steps of the snail and the teeth of the rack, due to the thickness of the

diameter of the pin. Care is also needed for the beak of the gathering pallet to pick up the rack teeth cleanly and not catch in any way on the tips of the rack teeth.

The gathering pallet

When all the rack teeth are gathered up, the rounded tail of the gathering pallet should rest on the stop pin slightly more to the right of the centre of the pin, the effect being that when the rack hook is lifted the tail of the gathering pallet tends to push the rack to the left. To lock the gathering pallet to the square of the pallet pivot, a very small cross pin is usually fitted; this means softening the steel before drilling the hole. Another method which the writer has adopted is to soften the steel and put a thread on the corners of the square and fit a small nut to bind the gathering pallet to the square part of the pivot end. The rack spring is cut out of hard brass $\frac{1}{16}$ in. thick with a piercing saw, the spoon shaped end is cut to shape as shown but the spring part is cut straight and finished with files and bent to shape afterwards; this applies to all springs.

The warning lever and lifter

This is shown in position in Fig. 2, Nos. 3 & 4. A pin in the back face of the reversed minute wheel on approaching the long brass arm on the warning lever will cause it to lift a pin in the arm of the steel lifter to raise the rack hook just clear of the first tooth in the rack. The rack will at once fall and the pin of the rack tail will contact one of the steps of the snail. Just before this happens, a pin in the minute wheel (friction fitted to the front pivot of the centre wheel) will, with the aid of the jumper and spring, have moved the star wheel on one tooth space and one of the steps of the snail. The rack having fallen, the striking train becomes unlocked and will run until the pin on the warning wheel is arrested by the steel block fixed to the inner side of the lifter passing through a slot cut in the front plate.

The pin in the reversed minute wheel will continue to raise the lifter a little more, until finally the pin will go past the extremity of the warning lever, allowing it to drop and freeing the locking block on the lifter from the pin in the warning wheel. When this happens, the rack hook will drop into the appropriate tooth of the rack and the hour will be struck and the pin in the rack segment will arrest the train by contacting the back end of the gathering pallet. When assembling the striking train, the tail of the striking hammer must lie between two lifting pins of the pin wheel; to do this the back pivot of the pallet wheel is fitted with a removable bush to the back plate (see Fig. 11).

The repeating mechanism

This as previously stated is positioned above the time train great wheel and fusee. At the top (Fig. 4) is seen the repeating barrel with its great wheel fixed to it, this meshes into the pallet wheel pinion near the front plate. The pallet wheel lies between the back end of the repeating barrel and back plate, it then meshes with the warning wheel pinion near the back plate; the warning wheel lies between the front plate and the ratchet wheel on the arbor to the repeating barrel. Finally the warning wheel meshes into the fly pinion next to the front plate. Attached to the back plate and concentric with the repeating barrel is the small spring barrel for driving the repeating barrel. Referring back to Fig. 2, the relative positions of the repeating levers will be seen. The positioning of the rack will be obtained the same way as that of the striking rack. Note that the gathering pallet rotates the opposite way to that of the striking gathering pallet; the first tooth space in the rack is made extra deep and the rack hook is pressurised by a rather strong spring, the warning wheel in this case has no pin in it.

On pulling the repeating string (Fig. 11), the spring in the barrel will be wound up, at the same time detent No. 6 on the same arbor (Fig. 2) will knock up the repeating rack hook. A pin near its left-hand extremity will also knock up the striking rack hook and warning will occur of the striking train. At the release of the string, say around 3-15, the repeating rack hook will drop into the first tooth of the rack and one peal will be sounded on the six bells, but the striking will still be held up until the repeating rack hook has dropped into the deep tooth space of the rack which is made much lower than the other tooth spaces. Thus the lifter of the striking train is brought out of the path of the pin in the warning wheel. At the half hour, two peals are sounded, followed by the hour; at the three-quarters, three peals are sounded, followed by the last hour being struck. When the hands are at the hour, the pin in the minute wheel will have moved the star wheel and snail to the next hour to be struck. On pulling the repeating string, only the hour would be struck, which is correct, the high step of the snail on the reversed minute wheel will not allow the repeating rack to fall and the repeating rack hook will fall back again into the deep tooth space of the rack; but when the spring of the repeating part is pulled, the rack hook will knock up the striking rack hook via the warning striking lever, allowing the striking to warn, but as soon as the repeating rack hook has dropped to its lowest position, the warning lever and lifter will be clear of the pin in the striking warning wheel and the hour will be struck.

The spring of the repeating barrel needs always to have some reserve of force remaining after the three peals (the longest run) have been sounded. From Fig. 11 it will be seen that there are three pins screwed into the back plate very close to the periphery of the repeating pulley; these are for preventing the string from straying from the groove in the pulley. When the repeating train is assembled, the hammer tails of the hammers in the assembly frame must be between two adjacent sets of lifting pins in the barrel. To facilitate this, a removable bush is made in the back plate similar to that of the striking mechanism.

The hammer frame

Fig. 12 shows the details of the repeating hammer frame. No. 1 is one of the hammers, which latter are built up from mild steel, the blade portion working in the slots of the hammer block is made of $\frac{1}{16}$ in. mild steel plate, the hammer stem is of soft mild steel wire, a short hole is drilled in the thickness of the blade and the end of the steel wire reduced in diameter to fit the hole. When assembled, the joint is fluxed and a speck of silver solder applied, it is then held over a bunsen burner and the solder will easily flow and make a good joint. The hammer head is made of either steel or brass and a 10 BA tapped hole is made to receive the threaded end of the steel wire. No. 2 shows the hammer positioned in one of the slots which can be made by careful filing, but a $\frac{1}{16}$ in. slitting saw would do this better. Before slotting the block, a hole is drilled the entire length of the block to accommodate the pin that holds the hammers in the slots; the hammer block is held to the $\frac{1}{16}$ in. thick base plate by three equally spaced 10 BA screws put through the underside of the base plate into the block; on top of the block is a $\frac{1}{16}$ in. thick brass strip which is a stop to arrest the hammers after striking. This is screwed to the top block with three 10 BA screws.

To be continued

SMOKE RINGS *continued from page 527*

celebrations, a special souvenir £1 ticket (50p under 14) can be obtained from the Fares & Charges Office, 55 Broadway, London, S.W.1. This will entitle the holder to travel by any underground train to the City—Moorgate or Barbican—to see and photograph the steam-hauled train as it begins its journey, and it will also include admission to the Neasden Depot.

Reeves catalogue

I have just received a copy of Messrs. A. J. Reeves' new catalogue. Castings for locomotives of all kinds, for the "Allchin" and "Minnie" traction engines and several stationary and marine steam engines are listed, together with a great variety of lathes, small tools, and materials of all kinds.

Reeves also supply a most useful 12 in. boxwood scale rule calibrated in $1\frac{1}{16}$ in. scale, $1\frac{1}{2}$ in., $\frac{1}{2}$ in. and $\frac{3}{4}$ in.

Western Districts live steamers

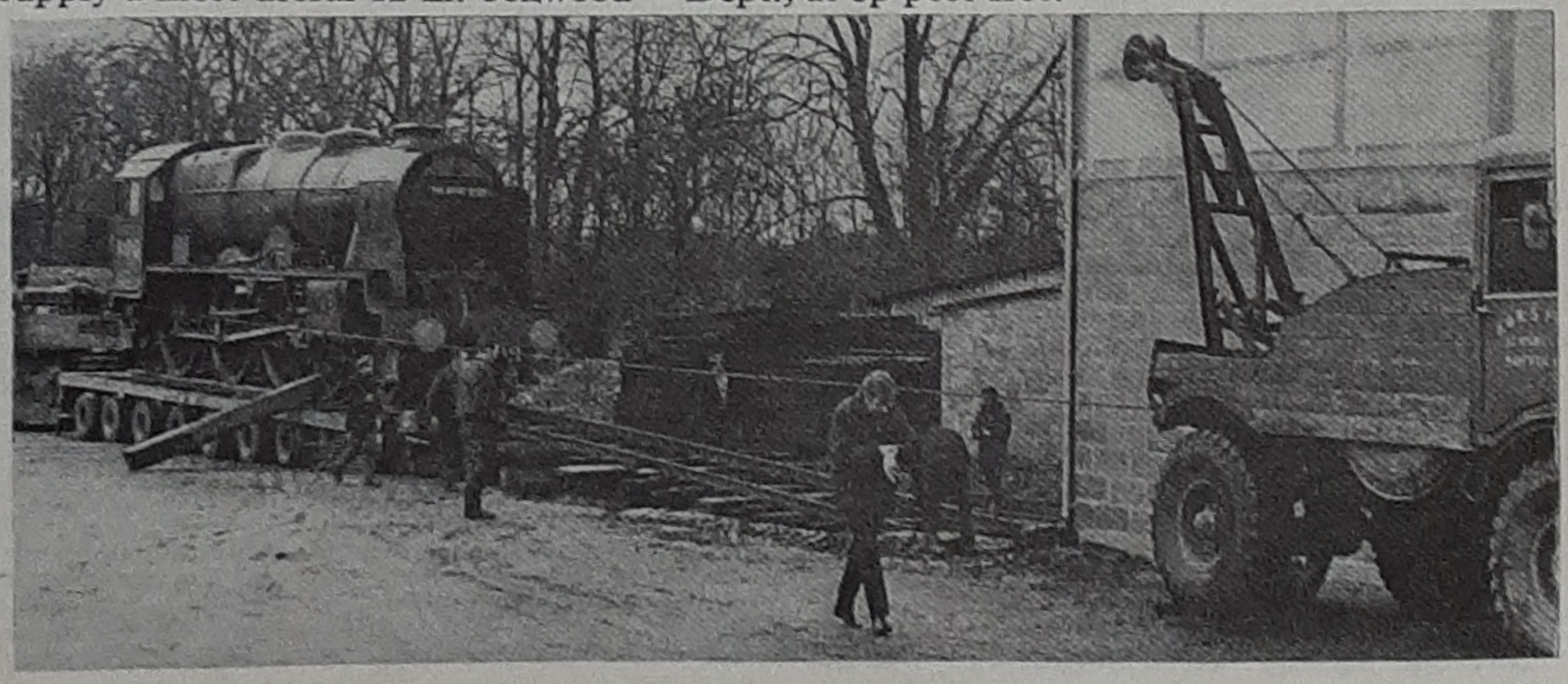
In "Smoke Rings," September 1970, I referred to the Western Districts Live Steamers of Australia, but unfortunately reported that this society was situated in Western New South Wales; in fact this should be "Western Districts of the city of Sydney." The present secretary is Mr A. P. Russell of 1 Lime Street, Cabramatto, 2166, N.S.W.

New Arrivals at Bressingham

Recent arrivals at the Bressingham Museum include the ex-L.M.S. 4-6-0 *Royal Scot* from Butlins, the Adams B.4 dock shunter which formerly worked in Southampton docks, and a "Terrier," No. 32662 (ex No. 62, *Martello*).

Indexes for 1970

Indexes for 1970 are available from our Sales Dept., at 8p post-free.



Lowering "Royal Scot" to ground level on arrival at Bressingham.

Photographs by Michael Warner.

CLUB NEWS

Left : A general view of the exhibition at Bedford

Exhibition at Bedford

A successful model engineering exhibition was held on March 13 at the Civic Theatre, Bedford, organised by the Bedford Model Engineering Society. A wide variety of models included a fine 2 in. scale "Thetford Town" traction engine by L. Wooding and Mr C. Cole's double tandem compound vertical marine engine. A number of models were run on compressed air, set off by a beautiful set of gallopes by Mr B. Pike.

Secretary: Robin Neighbour, 11 Wilden Road, Renhold, Beds.

News from Torbay

The inaugural meeting of the Torbay Model Engineering Society was held on February 11, at the Arcadia Private Hotel, Paignton. Sixteen attended, and membership is now thirty. The next meeting will be held on June 11 at the Foxhole Community Centre, Belfield Road, Paignton, at 7.30 p.m.

Secretary: Mr Leeding, 15 Pembroke Road, Paignton, Devon.

Bracknell Railway Society

Meetings of the Bracknell Railway Society are held in the Pavilion, Jocks Lane Recreation Area, Bracknell, Berks, normally at 7.30 for 8 p.m. The Society have a $3\frac{1}{2}$ in. and 5 in. gauge permanent track at Jocks Lane, and public running days will be held on June 13, July 11, August 8 and 29, September 12 and October 10—at 3 p.m.

Secretary: D. W. Alford, 1 Dashwood Close, Bracknell, Berks.

CLUB DIARY

Dates should be sent five weeks before the event. Please state venue and time.

June 4 Rochdale SMEE. General meeting. Lea Hall, Smith Street, Rochdale. 7.30 p.m.

June 4 Romford Model Engineering Club. Competition night. Ardleigh House Community Association, 42 Ardleigh Green Road, Hornchurch. 8 p.m.

June 4 East Sussex Model Engineers. Short talks: (a) Bending Things, S. Garlick; (b) Locomotive Chassis Construction, Norman Cowtan; (c) Soldering, R. Beames; (d) Drilling and Tapping, J. Burgess. 7.30 p.m.

June 5 Southern Federation of Model Engineering Societies. 3rd Annual Southern Federation Rally. North London track, Colney Heath. 10.30 a.m.

June 5 Edinburgh SME. West Edinburgh Conservative Association. 2 p.m.

June 5 The Gauge '1' Model Railway Association. Get Together. R. Symes-Schultzmann, 25 Winderness Road, Onslow Village, Guildford. 2 p.m.-7 p.m.

June 5 The Society of Model & Experimental Engineers. Talk: "Bits and Pieces" seen on the table.

June 5-6 West Riding Small Locomotive Society. Annual rally. Blackgates, Tingley, Nr. Wakefield. All locomotives $2\frac{1}{2}$ in. to $7\frac{1}{4}$ in. and their owners welcome.

June 5/6 NTEC. Devon Traction Rally. Newton Abbot Racecourse. Details from F. G. Burt, 17 Toronto Road, Exeter, EX46 LE.

June 5/6 NTEC. Balloon ascent and vintage vehicle rally. Woodhouse Farm, Earl Shilton, Leics. Details from J. Cooper, 1 Cedar Road, Earl Shilton, Leicester.

June 5-6 Worthing & Southern Counties Historic Vehicle Group. Hadlow Down, near Uckfield. Annual Steam and Old Transport Meet.

June 5/6 North London SME. Open weekend at newly extended Colney Heath track, Herts. Southern Federation Rally on the Saturday.

June 6 Chelmsford SME. Public running. Waterhouse Lane, Recreation Ground, Chelmsford. 2.30 p.m.

June 6 Witney & West Oxfordshire SME. Open day at Blenheim Park track, Woodstock, Oxon. Apply to Hon. Sec.: R. C. H. Chilton, 41 Waverley Avenue, Kidlington, Oxford, OX5 2NA for car passes for entry to Blenheim Park.

June 6 Warrington & District MES. Club invitation day, for locomotive running on $3\frac{1}{2}$ and 5 in. track at Daresbury Hall Spastics Home.

June 6 Guildford MES. Running day for members and friends at H.Q., Stoke Park.

June 6 Harrow & Wembley SME. Pondside meeting. West Harrow Recreation Ground. 10.30 a.m.

June 6 Birmingham SME. West Midland Federation meeting at Kinver track. Please support this even event if you do not have a locomotive.

June 6 Edinburgh SME. Glasgow track meeting. 2 p.m.

June 6 Sunderland MES. Open day. Roker Park, Sunderland. Members from other clubs welcome.

June 6 Colchester SMEE. Informal track day. Old Allotments, Lexden.

June 6 City of Leeds SMEE. Working meeting at Temple Newsam. 9.30 a.m. Public running 2.30 p.m.

June 9 Southampton & District SME. General meeting/track competition. Bitterne Park Social Club. 8 p.m.

June 9 Harrow & Wembley SME. Track meeting. B.R.S.A. Sports Ground, Headstone Lane. 7 p.m.

June 11 Torbay MES. Meeting at the Foxhole Community Centre, Belfield Road, Paignton, Devon. 7.30 p.m.

June 11 Bracknell Railway Society. "Walschaerts' Valve Gear," illustrated talk on the principles by Derek Alford. Pavilion, Jocks Lane Recreation Area, Jocks Lane, Bracknell. 7.30 p.m.

June 11 Brighton & Hove Society of Miniature Loco Eng. Annual general meeting. Elm Grove School, Elm Grove, Brighton. 8 p.m.

June 12 Bristol SMEE. Public day. Canford Park Track. Westbury on Trym, Bristol.

June 12 Midland Area Talyllyn Railway Preservation Society. Annual railway fete at the Hilton Valley Railway (on A454 Wolverhampton to Bridgenorth road.

June 12 Weston-super-Mare & West Huntspill Live Steam Soc. Visitors' locomotive day. New Road, West Huntspill, just off A.38 at Highbridge, Somerset.

June 12 Edinburgh SME. Meeting at Craigmount School. 2 p.m.

June 12 The Society of Model & Experimental Engineers. Day visit to SMLS, Beech Hurst, Haywards Heath.

June 12 Brighton & Hove Society of Miniature Loco. Eng. Hove Park track day.

June 12 Ickenham & District SME. Annual Open Day rear of Coach & Horses, Ickenham, Middlesex. Details: P. J. Pardington, 78 Campden Road, Ickenham, Middx. Tel: Ruislip 38640.

June 12/13 Fosseway Steam Rally. Newark Showground, Newark, Notts. R. D. Eveleigh, 35 Harewood Crescent, North Hykeham, Lincoln.

June 12/13 Festiniog Railway Society. Exhibition at Fareham Community Centre, Drill Hall (behind Co-op), West Street, Fareham, in conjunction with Fareham MRC. Model railway layouts, model fairground, live steam exhibits. 10 a.m. to 7 p.m. Saturday; 11 a.m. to 4.30 p.m. Sunday.

June 12/13 East Anglian Traction Engine Club. Traction Engine Rally, Langford Park, Langford, Nr. Maldon, Essex. Open 10 a.m.

June 12/13 NTEC. Camerton Steam Traction Rally, Clandown, Camerton, Bath. Details from D. Cleaves, 60 North Road, Midsomer Norton, Bath. BA3 2QQ.

June 12/13 NTEC. Hungerford Rally. Details from J. Newton, 6 High Street, Hungerford, Berks.

June 13 Chelmsford SME. Public running. Waterhouse Lane Recreation Ground, Chelmsford. 2.30 p.m.

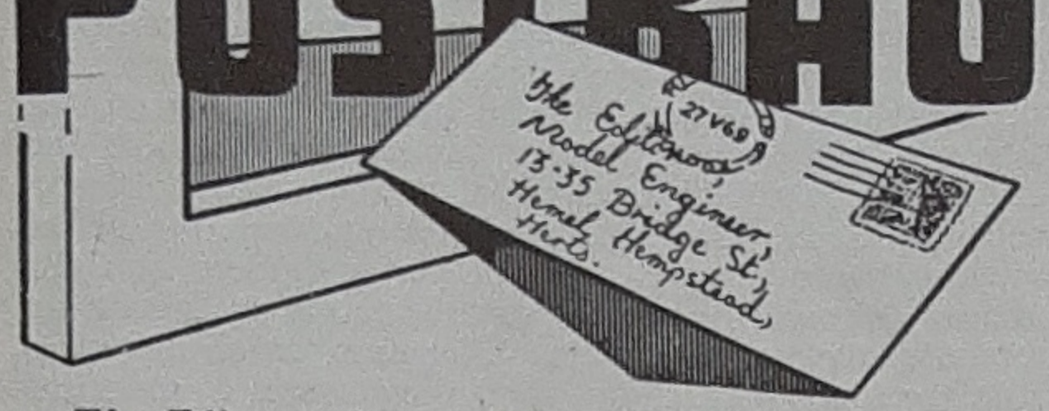
June 13 Bracknell Railway Society. Public running day at Jocks Lane Railway, Jocks Lane, Bracknell. 3-6 p.m.

June 13 Northampton SME. Public running. Delapre Park, London Road. 3-5 p.m.

June 14 Bedford MES. Talk on church organs and fair organs, also general information evening. The "Swan," Goldington Green, Bedford. 7.30 p.m.

June 17 Nottingham Society of Model and Experimental Engineers. Talk on Model Steam Locomotives. Martin Evans, Editor "Model Engineer." Friends' Meeting House, Claredon Street. 7.30 p.m.

POSTBAG



The Editor welcomes letters for these columns. He will give a Book Voucher for £1.50 for the letter which, in his opinion, is the most interesting published in each issue. Pictures, especially of models, are also welcomed. Letters may be condensed or edited.

The M.E.

SIR,—Re Mr T. Dalziel's latter in " Postbag " M.E. April 16, I agree very much with what he says, as I myself feel the M.E. is nowhere near the standard of a few years ago. Then, there was a real variety of subjects dealt with; even to take any copy at random the reader would always find a subject to catch his eye, and eventually to work on.

Today locomotives steal the limelight, and the enthusiast is very well catered for, having in the current copy no less than 13 pages on that subject. My interest is traction engines, the subject of which gets two pages (this includes four fairly large photographs) in the current copy, and very little information that could be helpful to a modeller.

I would like to see a bigger percentage of space devoted solely to readers' own models, with photographs and descriptions of the building, during different stages of their construction. This I feel would certainly help modellers a great deal, for so many must have problems very similar to one another.

The photographs on the front cover of M.E. are excellent, and being in colour, to my mind, are worthy of framing, for pasting on a wall board, or to form a scrap book. To do this, of course, the original copy of M.E. would have to be defaced, by loss of cover, and made almost worthless. Would it not be a possibility to offer prints of front cover pictures for readers ? I am sure many enthusiasts would start a collection if this were possible. Not wishing to deface my own copies of M.E. is the sole reason I have not started a " Model Engineer " Picture Gallery.

Dunkirk, Nottingham. C. J. WILSON.

SIR,—So we are informed that the *Model Engineer* is not so good as it used to be; I entirely agree, it is not, it is a great deal better !

As one of what, in the natural order of things, must be a very small band of living readers who started with No. 1 in 1898, I would most emphatically contradict the allegation that it is not so good as it used to be. Prior to the change of ownership when " M.A.P." took over, it undoubtedly reached its highest standard in the later 1930's during which period the late G. S. Willoughby, the late C. M. Keiller, the late E. T. Westbury and the late Henry Greenly were all regular and outstanding contributors. Of course, the M.E. has always been fortunate in having outstanding contributors, in earlier days Henry Greenly, Henry Muncaster, Tennant, Ferriera, Henry Lea, and over a very long period A. W. Marshall and George Gentry spring to mind, whilst Austen Walton's long series on " Twin Sisters " has never been excelled, for completeness of detail and comprehensiveness.

But this is the important point. These were the high spots and there was a good deal of not so hot matter to fill out. The general standard of production today is far better than ever before, paper, typography and above all, reproduction of illustrations and drawings are of a far higher average standard than ever, whilst the delightful coloured front covers are a continual source of pleasure, never previously even approached. Compare the drawings of Martin Evans' series, with the crudities inflicted upon us in the locomotive line for more than 40 years. Often haphazardly dimensioned and insufficiently detailed, and not infrequently including errors which were either explained by blaming some poor anonymous draughtsman or lightly dismissed as of no consequence as " all you have to do is to make another part to the correct size."

Martin Evans and all his regular contributors inevitably occasionally make mistakes, but they have the grace to openly acknowledge them and offer their apologies. Today, one is allowed to criticise and indulge in controversy (which is the lifeblood of progress and improvement) even about model locomotives, a pleasant and healthy change from the old days.

As to the content of the M.E. today, this must obviously reflect the taste of its readers if it is to remain a commercial proposition, and it is pretty obvious that today model locomotives and traction engines (which latter, of course, include tractors, showman's engines, steam rollers, etc.) are right at the top and steam as a whole is as popular as ever, whilst workshop equipment, gadgets, and methods of working, along with I.C. engines (what a gap ETW has left here), power boats and sailing ships, all have a substantial public, as too has historical engineering and clockmaking, all of which are excellently catered for by the M.E.

I think that the M.E. is now of a higher standard, both production-wise and technically, than ever before, and I believe that this is primarily due to two reasons (1) its broadminded and enlightened management, and (2) the fact that for the first time in its long history the Editor is a highly knowledgeable and skilled model engineer himself, and is thus in an excellent position to assess the likely appeal and practical value of contributions; long may this happy state of affairs continue, " Floreat M.E."

Rustington, W. Sussex. K. N. HARRIS.

Metrication

SIR,—I feel compelled to make some comments regarding Mr N. J. Shaw's article on Metrication—No. 3414 April 2.

I would first ask if he intended the article to be taken at all seriously, since my own personal reaction was to think that it has been written specially to coincide with All-Fools' Day ! I wondered exactly what a " metric person " or a " metric laddie " would look like, and I was reminded of the " rubber foremen " and " plastic technologists " which one occasionablly sees in the " Situations Vacant " columns.

If he is in fact serious in this matter, then he should be taken severely to task, because the article is full of false statements, contradictions and distortions of the truth. Mr Shaw appears to have written the article, not from any genuine desire to inform readers of the possible difficulties associated with the use of SI Metric units, but rather to air his own prejudiced views about professional engineers, schoolteachers and foreigners. I would point out, in case it has gone unnoticed by Mr Shaw, that we in this country have been overtaken by a second Industrial Revolution based upon scientific knowledge and involving us in very fierce and talented

competition from overseas. The gap which has admittedly opened up between the amateur and professional engineer is due mainly to the increased scientific knowledge which is now demanded by industry from its engineers and not from any deliberate high-handed attitude on the part of the Engineering Institutions.

As an extreme example of this, I have no doubt that the gifted amateur engineer is quite capable of inventing a better " mousetrap " as Mr Shaw suggests, but I am equally certain that he would be seriously embarrassed technically if asked to contribute to the design and development of a nuclear power station, supersonic aircraft, or high-speed hovertrain.

Despite this gap in scientific knowledge, however, amateurs and professionals will always have many points of contact, including their mutual interest in the history of engineering, together with its practical embodiment in model form and also in the study of the lives of the great engineers who helped to promote the first Industrial Revolution.

Finally, a piece of serious advice for the many technician apprentices and budding engineers who regularly read M.E. in order to broaden their technical knowledge. I would strongly recommend that they do not take Mr Shaw's article too seriously, but that they inform themselves of the advantages and disadvantages of SI units from the numerous articles and pamphlets published during the last few years by the various professional bodies and in the technical press.

Llantrisant, Glam. W. H. McKENZIE.

SIR,—I feel I must comment on Mr Shaw's article on Metrication. Whilst agreeing that the M.E. must be fair to all shades of opinion, I am surprised that such an article was even considered for publication in that it does nothing to explain the " new " SI units, simply decrying the system in practically every sentence.

Perhaps I am being unfair, having yet to read the next instalment of Mr Shaw's article, but I do feel what has been written is in many cases irrelevant and grossly misleading. Having been responsible for drawing up a plan for metrication in an engineering company employing about 1,600 personnel, I do feel competent to discuss this thorny subject.

I agree that there are some oddities in the SI system, but so there are in others; while not defending the system (I am too conversant with imperial units to immediately accept the new units, but on the other hand I do not find it too difficult to work with SI) it has been devised with a definite object in view, and this cannot be judged by its short term effects. It should be remembered that the changeover was initiated by industry and NOT the Government, costs due to metrication being borne by industry. Also it is not compulsory for industries to change, and indeed some will probably take many years to do so.

Before " SI " was introduced, the metric system on the continent was a tangle of different systems. SI has produced a rational system of measurement and will probably be adopted on the continent; considering the possibility of the U.K. entering Europe the adoption of SI would seem to have obvious advantages. Of course the majority of the world already uses the metric system.

Returning to the subject of model engineering, I feel that some helpful information would be more in keeping with M.E. In fact I would endeavour to provide such information if required.

Thanking you for a most interesting magazine.

Stevenage. R. K. HARPER.

Hot Air Engines

SIR,—I was interested in Mr King's article on Hot Air Engines in *Model Engineer* for March 19, 1971, in which he described the Bernier engine, with which I have not previously been acquainted. On examining the drawings however, I would imagine there would be a great deal of lost motion due to wear, unless the engine was in the hands of a skilled mechanic. Robinson accomplished a much simpler design with far fewer moving parts, to make use of two cylinders at right angles, although he used external heating and made no attempt at close governing. The number of surviving Robinson engines show that they were a practical proposition.

Mr King thinks I was rather hard on the work of Sir George Cayley in my notes on hot air engines in the issue for November 20, 1970; I merely remarked that the life of the cylinder, piston, and valves was comparatively short: the foundation for my remarks, came from the notes of Sir George Cayley himself, in which he described his efforts to combat the shortcomings of his engine. Mr King further takes me to task in his sixth paragraph, for an opinion I certainly did not express; I did not even mention producers and " Air-locks ": I merely stated that Cayley's engine was the forerunner of the suction gas engine, which is quite correct. If hair splitting is to be indulged in, Cayley's engine could really be called a suction gas engine, as atmosphere drawn through a coke fire mingles with the products of combustion and becomes a crude gas. Cayley's engine inducted this gas by suction although the expansion of this gas was not effected by ignition, but by the heat absorbed in its passage through the fire. The addition of a water spray, and means of timed ignition, together with the use of a scrubber to remove grit, tar, etc., from the gas as it was drawn through, came some 40 years later, and the suction gas engine became a workable prime mover, in fact one of the cheapest methods of obtaining power from heat available to industrialists requiring limited power.

As to Sir George Cayley being described as the " Grandfather of the gas turbine," surely this title should be bestowed upon John Barber of Nuneaton, Warwickshire, whose patent of 1791 embodied all the principal components of the present day gas turbine in the specification.

I notice Mr King, in his concluding paragraph mentions that Philips have produced a highly satisfactory machine for the production of liquid air, using the Stirling cycle in reverse; I would add that an ordinary Stirling cycle engine when driven from an outside power source, can be regarded as the basis of a modern refrigerator plant.

Newcastle upon Tyne. E. H. JEYNES.

Greenly's Undertype Engine

SIR,—It is interesting to compare Mr Taylor's general arrangement drawing with that of the Greenly 1903 undertype (not 1901) as published in the M.E. for January 1 of that year (Vol. VIII). On page 12 appeared the first of a series of articles. Incidentally, Greenly was a member of the M.E. technical staff working with Percival Marshall at that time and until about 1908. A noticeable feature of the Greenly design was the fitting of " Field tubes " in the firebox crown to accelerate evaporation. They are clearly shown in the coloured plate presented with that particular issue.

Teignmouth. ERNEST A. STEEL.

Stiffness of Steel

SIR,—I have been expecting Mr K. E. G. Andrews to issue a correction to his letter (M.E. February 19, 1971)

but as this has not appeared to date I feel that in the interests of accuracy the correction should be made.

The correction is called for in the figure quoted viz. 538—the formula should read:—

$$\theta = \frac{583TL}{ND^4}$$

I have checked this in Morley—quoted by Mr Andrews—and in several other books in my possession.

The difference would cause an appreciable error in any calculation.

Richmond, Surrey. A. H. JACKER.

Leaf Springs

SIR,—With reference to Mr Young's article March 5. Yes, it is true that I asked for a supplier of spring steel when I met Mr Benny at the exhibition in 1969, but the suggestion was useless, the reason being that this kind of steel is only supplied in stock sizes which in most cases will not do if one wants to make working leaf springs to scale.

Let us take an example. The tender springs on my *City of Truro* have 16 leaves taking up a total depth of $7\frac{1}{8}$ in. in full size. Now in $1\frac{1}{16}$ in. scale this will give a thickness of .043 in. for each leaf, which thickness is, I think, not obtainable. Now even if this thickness is obtainable, when one gets 16 leaves together one might just as well have a solid block for all the spring one would get. So I use what experience has taught me to use, very hard alloy nickel silver. This because I am equipped to roll my metal to correct thickness which to me is very important. Now having got the leaves to correct thickness, one still has an almost solid block so far as springing is concerned. The answer to this is to cut the middles out of each leaf except the top and bottom ones. If any reader would like me to elaborate on this I shall be glad to do so.

Let me assure any reader that by this method one can get the desired strength of a spring to any combination of leaves. The other item Mr Young mentions is the springs of lubricator pawls. Let me say that I do not use a pawl on lubricators and have never done so. If any reader wishes to know my system, again I shall be glad to enlarge on this subject.

Wroxham. A. G. PEACOCK.

Hindley's

SIR,—Re: Mr T. Gibbard's enquiry about Hindleys of Dorset—they were taken over by the Norfolk firm of Dodman about 1929.

As an apprentice, I remember the five cylinder Hindley gas engine at Witney, particularly on one or two occasions when the governors stuck, and the station voltmeter went to the top of the dial, 250v. plus.

After the first War another Hindley was purchased, similar, but larger, 100 KW. This outfit would never do its full load, the makers blamed the suction gas generator as being inadequate. Although these engines were advertised as having "silent exhaust"—substantially true of the first engine, the racket the new one made could be heard a mile away. It sounded like a set of steam ploughs travelling on a hard road.

Oxon. J. BRICE.

Locomotive swaying couple

SIR,—The recent letters on this subject have interested me and jogged my memory about an article I read in the Proceedings of the Institute of Mechanical Engineers Vol. 162, 1950 entitled "The Effect of Tapered Treads on the Motion of Overhead Travelling Cranes."

The gist of this is that an axle having a pair of taper tread wheels that are rigidly attached to the axle will weave as it travels along the rails. This is caused by the need to have some clearance and this allows a different diameter at each wheel to roll along the rails. Clearly the larger diameter will overtake the smaller until it rolls down to a smaller diameter, when the other wheel will overtake it in a wave type of motion. The authors refer to the connection with this matter to the oscillations of railway vehicles. The article shows how the amplitude of the wavelength may be calculated and it seems to me that anyone who had technical data on the engines referred to could do some sums. The article mentioned the effect of this weaving on the flange wear and perhaps people with experience of a particular locomotive and its swaying could say whether it suffered excessive flange wear.

Fleet, Hants. J. BAMFORD.

Model threshing machines

SIR,—With reference to the letter from Mr G. W. Taylor in M.E. No. 3411, I was pleased to learn that he found my article interesting, having conducted somewhat similar experiments himself.

If I understand his letter correctly, it is clear that he has worked on different lines from those which I pursued, as he refers to having tried different slopes for the riddles and he evidently had a fair amount of freedom in arranging his component parts.

In my own case the model when first made was, to use his own words, "a scale model which just revolved" I was thus faced with two problems, (a) to make the model work and (b) find some plant or combination of plants which would give straw, cavings, chaff and grain and thus enable the complete set to depict the threshing scene reasonably correctly.

Regarding (a), the slope of the riddles was only about 3 deg. as in full-size and could not be altered, as to do this would have meant rebuilding the machine with increased height and spoiling its scale proportions; movement down the riddles was achieved as I described, (b) was resolved by the discovery of the Ribwort plantain; when this is mixed with dried grass blades, the required results are obtained, at least to my own satisfaction. Regarding the other points raised, the drum and concave are scaled down copies of full-size, actually taken from a Ruston machine and corresponding to a 24 in. drum, the largest fitted to their machines—$2\frac{1}{2}$ in. dia. on the model—and chosen in order that maximum inertia should be available to assist the engine governor gear in maintaining a steady speed.

The grass heads used in my initial experiments are, I believe, known as "Yorkshire Fog" and the trouble experienced was one of separation; this was easily established by an examination of the chaff and was, I think, due to the reasons I stated. From Mr Taylor's description of his drum and concave, I am doubtful whether his little machine could do much better than mine when using this grass. My own feelings are that in this small size of machine, a much more prolonged rubbing action is needed than that given by just the ordinary drum and concave, which prompted me to suggest that the addition of the peg drum and cage of a model clover huller might give the answer for this particular grass. For demonstration purposes, the grass heads have been superseded by the plantain; this was used at the recent M.E. Exhibition and several sacks of seed were obtained with little trouble, together with the approximately correct quantities of straw, cavings and chaff.

Rugby. G. W. COX.

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2 The competition will be divided into two parts:
Junior: Participants, either sex, under the age of 16 at time of entry. Within this group no heat or flame technique for moulding may be used, but any other form of adhesion may be utilized.
Senior: Participants, either sex, over 16. Within this group, any form of adhesion is accepted. Heat to bend or shape the pens may be used.

3 Entries for the competition must be accompanied by the official entry form below.

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7 Prizes will be awarded to competitors who, in the opinion of the panel of judges, produce the most creative, unusual or skilful entry for each quarterly competition.

8 **Quarterly prizes will be awarded as follows:**
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10 consolation prizes of £5 each.
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10 **Entrants should send their models to:**
The BIC Model-Making Competition,
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Should a model be considered delicate for conventional postage, then a photograph (colour or black and white) may be despatched beforehand. This will be used for preliminary judgement. Entry forms should be clearly attached to each model or photograph entered.

11 No responsibility can be taken for the damage in transportation of any model received. Judges will, however, take into account such unfortunate circumstances and the model will still be eligible for participation within the contest.

12 Should participants require a model returned, then return postage must be included by way of enclosing the appropriate stamps.

RESULTS

13 The 1971 competition will be held during 3-monthly periods and results will be announced during August 1971, November 1971, February 1972.

14 Participants should ensure that their models are despatched to arrive by 1st June (for August judging), 1st September (for November judging) and 1st December (for February judging).

15 Any model received after this date will not be eligible for the relevant Quarter but will qualify for the next Quarter's competition.

16 Any prize winning model will become the property of Biro-Bic Ltd., and may be used in any way they think fit.

17 Employees, relatives or direct associates of Biro-Bic Ltd., Model and Allied Publications Ltd., as well as their advertising agents will not be eligible for this competition.

18 The decision of the Judges is final and no correspondence can be entered into in relation to prizes awarded or decisions made.

I understand and abide by the Rules

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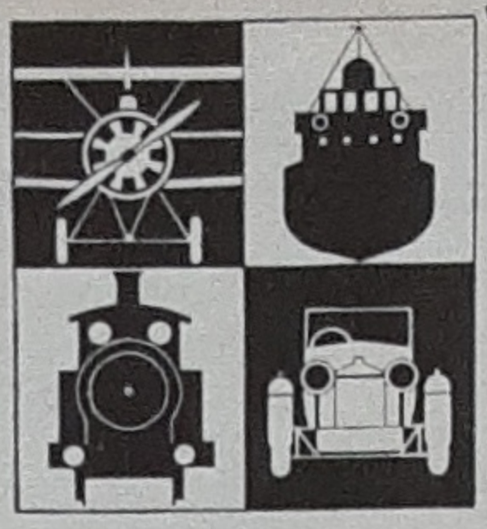

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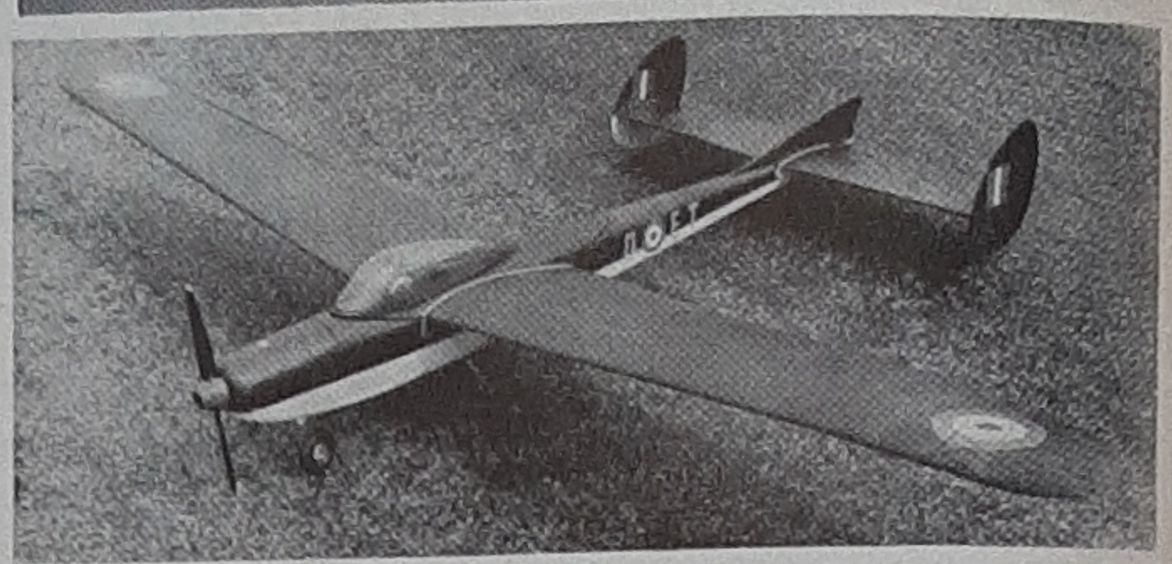

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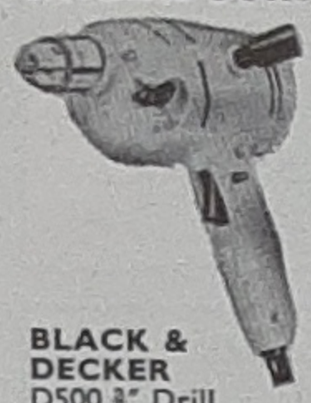

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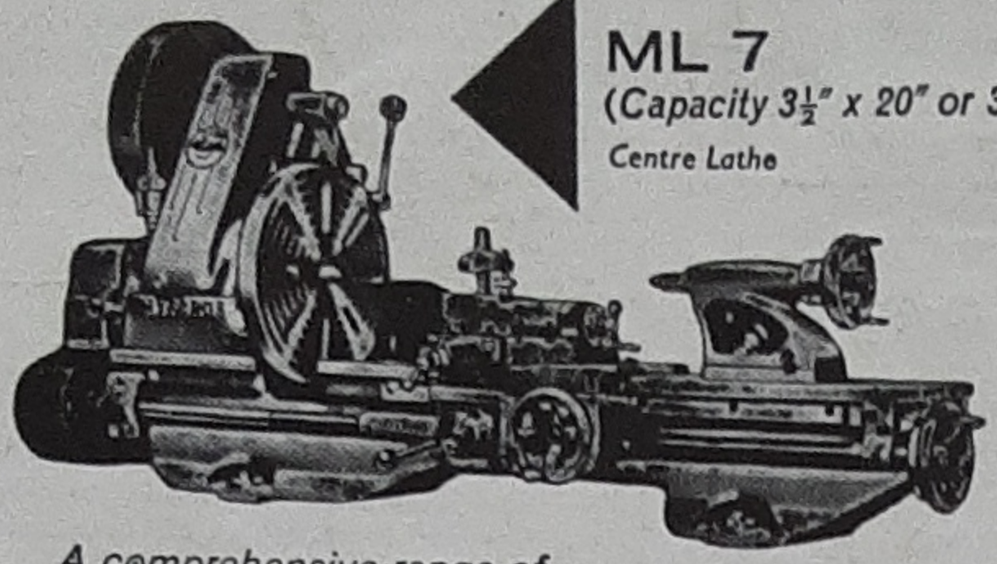

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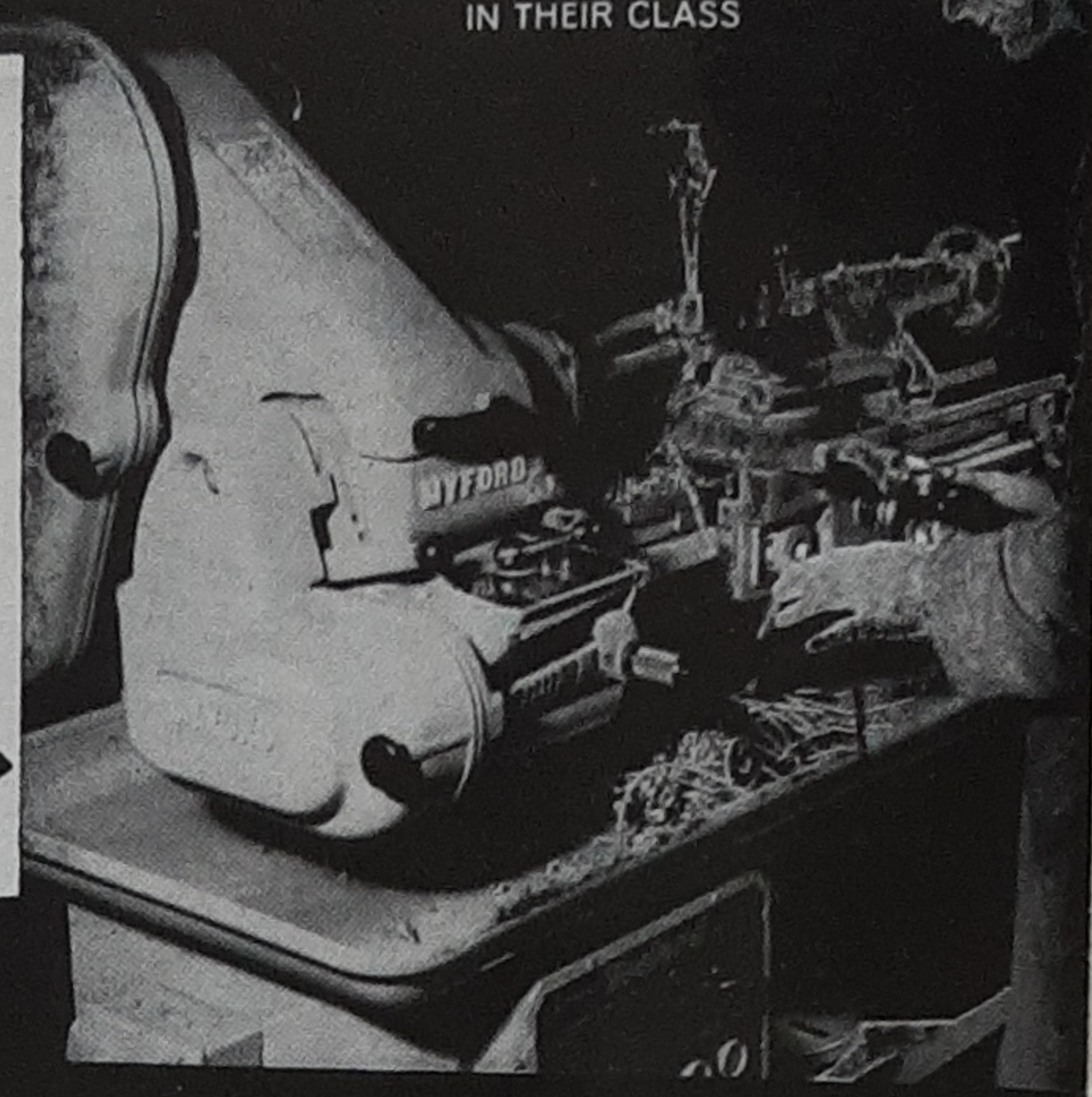

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